

ARI Research Note 2000-01

## **Training Battlefield Critical Thinking and Initiative**

**Marvin S. Cohen, Bryan B. Thompson, Leonard Adelman, and  
Terry A. Bresnick**  
Cognitive Technologies, Inc.

**Sharon L. Riedel**  
U.S. Army Research Institute

19991012 049

**Fort Leavenworth Research Unit**  
**Stanley M. Halpin, Chief**

October 1999

U.S. Army Research Institute  
for the Behavioral and Social Sciences

Approved for public release; distribution is unlimited.

DTIC QUALITY INSPECTED 4

**U.S. Army Research Institute  
for the Behavioral and Social Sciences**

**A Directorate of the U.S. Total Army Personnel Command**

**EDGAR M. JOHNSON  
Director**

---

Research accomplished under contract  
for the Department of the Army

Cognitive Technologies, Inc.

Technical review by

Robert E. Solick

**NOTICES**

**DISTRIBUTION:** This Research Note has been cleared for release to the Defense Technical Information Center (DTIC) to comply with regulatory requirements. It has been given no primary distribution other than to DTIC and will be available only through DTIC or the National Technical Information Service (NTIS).

**FINAL DISPOSITION:** This Research Note may be destroyed when it is no longer needed. Please do not return it to the U.S. Army Research Institute for the Behavioral and Social Sciences.

**NOTE:** The views, opinions, and findings in this Research Note are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision unless so designated by other authorized documents.

## REPORT DOCUMENTATION PAGE

1. REPORT DATE (dd-mm-yy) October 1999		2. REPORT TYPE Interim		3. DATES COVERED (from... to) March 1997 - March 1998	
4. TITLE AND SUBTITLE Training Battlefield Critical Thinking and Initiative				5a. CONTRACT OR GRANT NUMBER DASWO1-97-C-0038	
				5b. PROGRAM ELEMENT NUMBER 62785	
6. AUTHOR(S) Cohen, Marvin S., Thompson, Bryan B., Adelman, Leonard, and Bresnick, Terry A. (Cognitive Technologies, Inc.); Riedel, Sharon L. (Army Research Institute)				5c. PROJECT NUMBER 20262785A790	
				5d. TASK NUMBER 1111	
				5e. WORK UNIT NUMBER CO3	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Cognitive Technologies, Inc. 4200 Lorcom Lane Arlington, VA 22207				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral and Social Sciences ATTN: TAPC-ARI-RK 5001 Eisenhower Ave. Alexandria, VA 22333-5600				10. MONITOR ACRONYM ARI	
				11. MONITOR REPORT NUMBER Research Note 2000-01	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.					
13. SUPPLEMENTARY NOTES Contracting Officer's Representative: Dr. Sharon L. Riedel					
14. ABSTRACT (Maximum 200 words): The first objective of this research was to explore and identify the cognitive skills that individuals need to function effectively in domains that require them to cope with uncertainty, change and conflicting purposes. The second objective was to develop and test methods for training those skills in the context of Army battlefield decision making. The training aimed at improving the ability of Army tactical staff officers to grasp the essential elements of a complex, uncertain, and dynamic situation, visualize those elements in terms of their organizational goals, and take action in a timely and decisive manner. The identification of cognitive skills to be trained and training strategies is based on an original theory of critical thinking skills, the Recognition/Metacognition (R/M) Theory. The theoretical and empirical foundations of the R/M model are described using literature on mental models, expertise, behavioral decision-making, and pattern recognition. The critical thinking skills developed for training include (1) developing and using appropriate mental models of high-order purpose and of time orientation, and (2) applying critical thinking strategies to these models, including the identification and filling of critical information gaps and conflicts in situation understanding, goals and plans, and identifying and evaluating underlying plan assumptions. Training is implemented in a stand-alone Compact Disk (CD).					
15. SUBJECT TERMS Critical Thinking Skills, Training Battlefield, Initiative Computer Assisted Training					
SECURITY CLASSIFICATION OF			19. LIMITATION OF ABSTRACT  Unlimited	20. NUMBER OF PAGES  205	21. RESPONSIBLE PERSON (Name and Telephone Number)  Dr. Sharon Riedel, 913-684-9764
16. REPORT Unclassified	17. ABSTRACT Unclassified	18. THIS PAGE Unclassified			

# **TRAINING BATTLEFIELD CRITICAL THINKING AND INITIATIVE**

**Marvin S. Cohen, Bryan B. Thompson, Leonard Adelman, Terry A. Bresnick**

Cognitive Technologies, Inc.  
4200 Lorcom Lane  
Arlington, VA 22207  
(703) 524-4331

and

**Sharon L. Riedel**

U.S. Army Research Institute  
Field Unit-Leavenworth  
Ft. Leavenworth, KS 66027

**19 July 1999**

**Contract No. DASW01-97-C-0038**



## TABLE OF CONTENTS

	<u>Page</u>
ACKNOWLEDGMENTS.....	v
1. INTRODUCTION AND OVERVIEW.....	1
2. AN EMPIRICAL AND THEORETICAL MODEL.....	6
3. HOW CAN CRITICAL THINKING BE TRAINED?.....	30
4. CRITICAL THINKING TRAINING.....	41
5. INITIAL EVALUATION OF TRAINING SYSTEM PROTOTYPE.....	63
6. LESSONS LEARNED: TRAINING CRITICAL THINKING FOR INITIATIVE.....	78
REFERENCES.....	81
APPENDIX A.....	A-1



## **ACKNOWLEDGEMENTS**

We have benefited enormously from the advice and comments of General Leonard Wishart (U.S. Army Ret.), General William Richardson (U.S. Army Ret.), and General Dave Mead (U.S. Army Ret.), who served as consultants on this project. We are grateful to COL Douglas Tystad, COL Soby, and LTC William Hewitt of Command and General Staff College, Fort Leavenworth, KA, for their generous feedback and support. We particularly appreciate the collaboration of LTC William Hadfield in improving and testing the training, and the students in his course for participating in the evaluation. We thank LTC David Lacombe, MAJ Gary Jones, MAJ(P) Jeffery Engbrecht, LTC James Lunsford, and other instructors at CGSC for their feedback and cooperation. Last but not least, we wish to acknowledge Anthony Harrison and Adam Thornton for their prodigious work on the MENTALModeler software.

## 1. INTRODUCTION AND OVERVIEW

A U.S. Army infantry handbook published in 1939 states, "The art of war has no traffic with rules, for the infinitely varying circumstances and conditions of combat never produce exactly the same situation twice." Much the same can be said about business environments characterized by rapidly shifting technologies, markets, and competitive landscapes. The first objective of the research reported here was to explore the cognitive skills that individuals need to function effectively in domains such as these, i.e., that enable members of military, business, and other organizations to cope with uncertainty, change, and conflicting purposes. The second objective of the research was to develop and test methods for training those skills in the context of Army battlefield decision making. The training is aimed at improving the ability of Army tactical staff officers to grasp the essential elements of a complex, uncertain, and dynamic situation, visualize those elements in terms of their organization's goals, and take action in a timely and decisive manner. An essential part of critical thinking, when viewed in this way, is to balance *initiative* and *coordination*. The training method, like the theory of cognitive skill it is based on, is quite general, and could be readily applied in a wide spectrum of domains where individuals work in uncertain and dynamic organizational contexts.

### THE LINK BETWEEN CRITICAL THINKING AND INITIATIVE

The concept of initiative plays a key role in the theory of critical thinking processes, in the real-world practice of critical thinking, and in critical thinking training. To see why, we can start by distinguishing two advantages that teamwork may provide over an individual acting alone, and then look at why each of these advantages may fail to materialize: (1) The first advantage is based on *bringing together complementary inputs*, and derives from the coordination of multiple hands, eyes, heads, etc. to accomplish a complex task. Increased effectiveness comes from sharing of both physical and cognitive workload and through specialization of knowledge and skills.

However, there is another side of the coin. Increasing the size of an organization tends to reduce its overall efficiency unless there is also an increase in departmentalization and standardization of tasks (Blau, 1970). The latter features reduce flexibility of response in a changing or novel environment (Donaldson, 1995). A related problem is *goal displacement*, in which specialized units lose sight of the larger organizational purpose, and pursue their own goals as if they were fixed ends rather than means, which should be reevaluated when conditions change (Scott, 1998).

(2) The second advantage of teamwork is based on *choosing from among substitutable alternatives*, and derives from the diversity of competing solutions to the same problem that different members of a team can generate. Better decisions result if there is an effective organizational mechanism for selecting from, averaging, or mixing these diverse ideas to arrive at a single decision (e.g., Kerr, MacCoun, & Kramer, 1996).

But there is another side to this coin as well. Groups may be affected by socialization biases, such as "groupthink," which induce conformity rather than diversity of thought (Janus, 1972; March, 1996.). For this reason, group decisions tend to be better when individuals think about the problem independently before arriving at a group judgment (Castellan, 1993; Sniezek & Henry, 1990).

Both dangers – slowness of response to change and lack of innovative thinking – can be addressed by organizational structures that emphasize *decentralization*: granting individuals or subteams the autonomy to make decisions in their own spheres (Burns & Stalker, 1961; Van Creveld, 1985). The degree of appropriate autonomy varies. Decentralization and initiative are adaptive responses to specific organizational environments, and are not everywhere appropriate. Interdependency among team tasks, on the one hand, heightens the importance of coordination (Thompson, 1967), whether it is achieved implicitly on the basis of stable, shared knowledge of tasks, procedures, and other team members (Cannon-Bowers, Salas, and Converse, 1993; Cannon-Bowers, Tannenbaum, Salas, & Volpe, 1995; Kleinman & Serfaty, 1989), by contingency planning that begins when unexpected possibilities first become apparent (Orasanu, 1993), or by mutual monitoring, feedback, back-up, and closed-loop communication as the tasks are carried out (McIntyre & Salas, 1995). On the other hand, when the task environment is rapidly changing and uncertain, and especially when individuals or teams are *spatially dispersed*, decentralization and initiative gain in importance. In some cases, outcomes may be better when individual team members bypass standard procedures, question the accepted beliefs or practices of the group, and act on their own responsibility.

This is a not uncommon predicament in combat: Company E's job is to guard Company F's flank while Company F secures a bridge that the division intends to cross. Now, however, Company F appears to be stalled in a major firefight some distance from the bridge. Company E cannot raise either Company F or higher headquarters on the radio (and it will take too long for runners to find them and return). Should Company E sit tight until Company F is ready to seize the bridge or until communications are reestablished? Should it go help Company F in the firefight, at the risk of getting bogged down itself? Or should Company E take over Company F's task and attempt to seize the bridge now – a risky choice, but possibly the only way to accomplish the higher-level purpose of supporting the division in a timely manner?

The combination of time stress, spatial separation, and uncertainty – along with varying degrees of task interdependency – can alter the nature of teamwork, overlaying a set of qualitatively different decision tasks on the traditional ones. For example:

- *Should we communicate?* When events unfold in an unanticipated manner (*uncertainty*), advance planning and shared task understanding may fail to bring about coordination. The obvious solution is to communicate in real time, as the unexpected events occur. Yet the *dynamic, time-stressed* character of the situation limits the time available for real-time communication. Moreover, *spatial separation* imposes a bandwidth limitation on communication, slowing it down drastically and exacerbating the impact of both uncertainty and time constraints.<sup>1</sup> The upshot is that real-time closed-loop communication can no

---

<sup>1</sup> In earlier historical periods, commanders could often see a large part, if not all, of the battlefield, and could both see and be seen by their subordinates. In this situation, the shared visual context provided a high-bandwidth channel of communication, which could be effectively supplemented by a few quick words and gestures. By contrast, the lethality and mobility of modern war has led to a high degree of dispersion, for which modern communications technologies, such as radio, and sensors do not fully compensate (Van Creveld, 1985).

longer be regarded as routine. When an unexpected, time-critical problem arises, team members or subteams must decide whether or not the potential benefits of communicating and/or waiting for a response are worth the delay.

- *What will other team members do?* In time-critical situations, subteams will sometimes be unable to communicate, or choose not to communicate, with one another. If their tasks are interdependent, however, the success of one will depend on coordination with the actions of another. In these cases, team members or subteams must make autonomous decisions that depend on plausible assumptions about concurrent decisions being made by other subteams in other locations. Shared task, team, and team member models may help support such predictions, but cannot be fully relied on in novel circumstances.
- *How good is the information?* Even when team members and subteams do decide to communicate, the combination of bandwidth and time constraints will prevent them from sharing information fully. Communications (e.g., reports, feedback, orders, or advice) from another subteam will have to be evaluated with incomplete understanding of the sources and assumptions behind them, and, conversely, with the benefit of other information that is available locally but not to the subteam that originated the message.

In Section 2, we will describe an empirically based theory that addresses skills of this kind. We will argue that the skills underlying initiative involve *critical thinking about mental models* of the task and the team. In Section 2 we also illustrate the application of the theory by means of an actual example of initiative within a team, in a context where the degree of decentralization of authority happened to be somewhat ambiguous. In Sections 3 and 4, we describe a training strategy that is based on the theory and which focuses on the mental models and critical thinking skills that underlie decisions about initiative. The value of such training should be quite general. Virtually every team is to some degree a *distributed* team. Even when team members are within plain sight and hearing of each other (e.g., in an emergency room, airline cockpit, or the combat information center of a cruiser), the high workload associated with uncertainty and time stress can be quite sufficient to limit the rate of communication (Kleinman & Serfaty, 1989) and make initiative essential.

## OVERVIEW

Figure 1 provides an outline of this report, as well as an overview of the logical flow of the research. The training is based on empirical data and cognitive theory, both of which are summarized in Section 2. The data have been collected and the theory has evolved over several research projects that examined decision making in both Army and Navy battlefield environments (Cohen, Adelman, Tolcott, Bresnick, & Marvin, 1993; Cohen, Thompson, Adelman, Bresnick, Tolcott, & Freeman, 1995; Cohen, Freeman, & Wolf, 1996; Cohen, Freeman, & Thompson, 1998). In the Army context, we have interviewed nearly a hundred officers occupying a variety of positions and ranks and possessing varying amounts of experience. These data have been analyzed to find knowledge structures and cognitive strategies that tend to distinguish more effective from less effective officers in battlefield situations (Cohen & Freeman, 1998). Two key theoretical concepts emerged from this work, and will be described in Section 2. They are

(1) the use of *mental models* pertaining to organizational *purpose*, own and others' *intent*, degrees of *initiative*, team member *reliability*, and *action sequences*; and (2) the ability to *think critically* about these and other mental models in novel situations.

The last part of Section 2 illustrates how the theory applies to real-world decision making, by describing a military incident in which critical thinking influenced the outcome. Perhaps more importantly, this example highlights the role of critical thinking in decisions about *initiative* in a *team* and *organizational* context. As already noted, critical thinking is not just an individual decision making skill. When exercised by a *team leader* and/or *team-members*, it can profoundly alter group dynamics and have important organizational implications. We elaborate on the link between critical thinking and initiative within an organizational context in the second part of this Introduction.

Section 3 addresses the transition from empirically based theory to a training strategy. It outlines the rationale for a training strategy, including the roles of instruction, practice, and feedback, that is based on the theoretical model described in Section 2, and contrasts it with other training strategies based on different conceptualizations of decision making skills. It also lays out the critical thinking skills to be targeted by training, based on the data and cognitive theory, and describes a survey of student training needs that confirms the relevance of those skills.

Section 4 focuses on training materials developed for Army tactical battlefield thinking skills. The first part summarizes the content of the training, which includes five major segments: (i) mental models to represent purpose, (ii) critical thinking about purpose, (iii) time orientation (or initiative), (iv) critical thinking about time orientation, and (v) critical thinking about initiative in an organizational context. The second part of Section 4 describes a prototype automated training tool. The training content has been embedded within an automated web-capable tutor for training battlefield critical thinking skills. The system, called MEMO (for MEntal MOdeler), can be distributed on compact disc for use on a personal computer or can be accessed over the World Wide Web. It can be used by instructors in the classroom, can be assigned as homework, and can support distance learning and learning in the field.

Manual and automated versions of the training have now been successfully tested with active-duty officers in Army posts around the country. Section 5 summarizes the results of classroom exercises in which an initial prototype of the training system was tested. A subsequent report will expand on the evaluation by describing more recent phases of the research, including experimental tests of the training system with students at the Center of Army Tactics, Army Command and General Staff College.

Finally, Section 6 summarizes the lessons learned from this research.

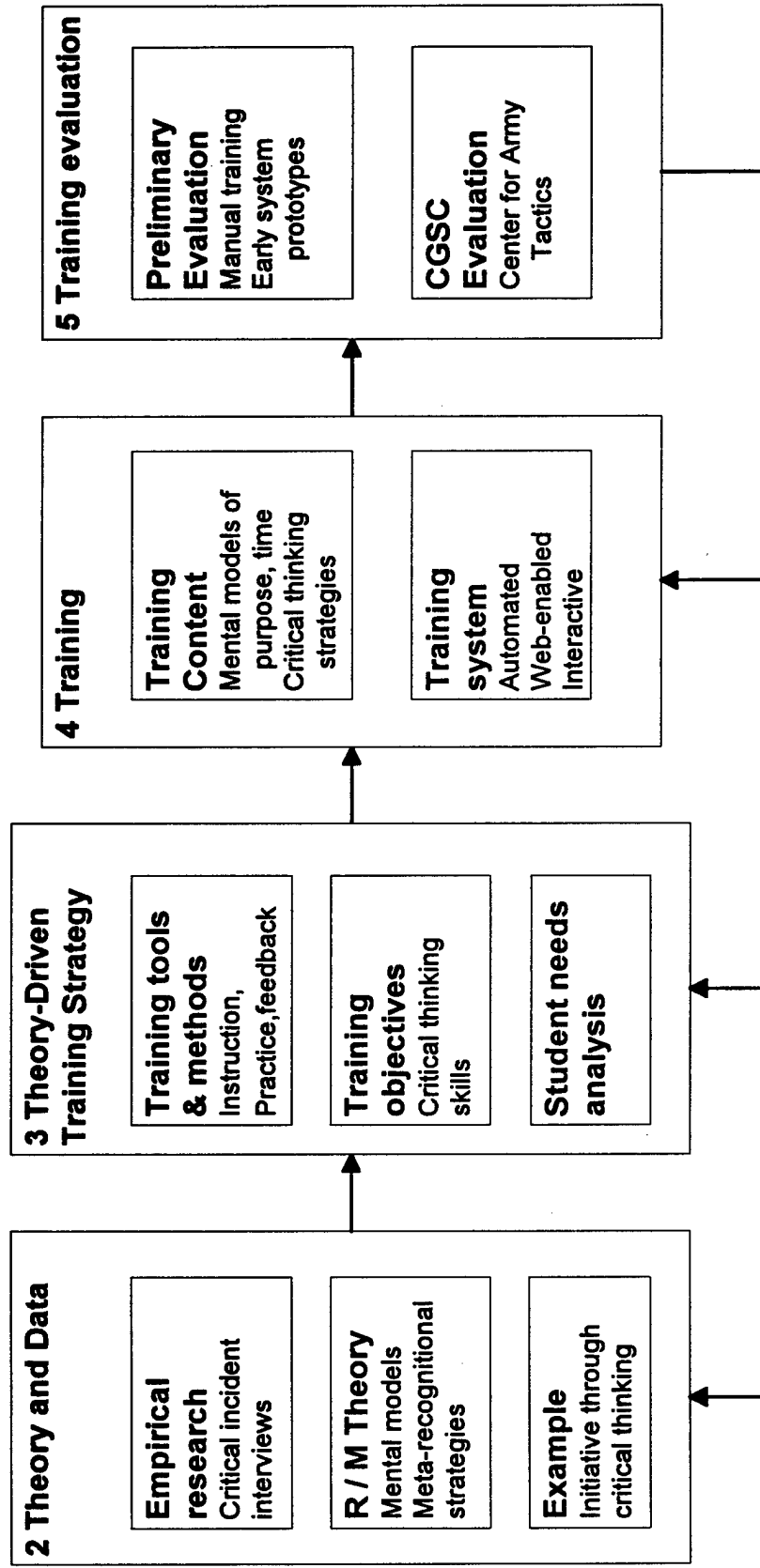


Figure 1. Outline of the report, and overview of the research.



## 2. AN EMPIRICAL AND THEORETICAL MODEL

This section summarizes the empirical and theoretical basis for a model of critical thinking skills. The first part reviews some relevant findings in the research literature on expert/novice differences. The second part reviews some of the data and conclusions in our own research on mental models. The third part summarizes a theory of critical thinking about mental models. The fourth and final section applies the theory to an example of an actual decision, illustrating the link between critical thinking and initiative.

### EXPERTISE

Studies of expert-novice differences suggest that expertise develops along two paths over time, one leading to better performance in *familiar* situations, the other leading to improved ability to handle *unusual* situations. A considerable body of research has focused on the first path: Experts accumulate a large repertoire of patterns and associated responses, which they use to recognize and deal quickly with familiar situations (Chase & Simon, 1973; Larkin, McDermott, Simon, & Simon, 1980; Klein, 1993). The difference between experts and novices, however, goes well beyond the quantity of patterns they draw on or the number of situations they regard as familiar. In fact, a key hallmark of expertise is *goal-setting*, or intentional creation of novelty. In fields such as writing and historical or scientific research, for example, experts are more likely than novices to identify opportunities for original, productive work, establish their own goals, and create challenging tasks for themselves, which cannot be solved by pattern matching alone (Ericsson & Smith, 1991; Anzai, 1991; Holyoak, 1991). Novel ideas and strategies are also important in military and business environments.

When performing a challenging task, whether self-created or externally imposed, experts and novices differ in other ways that are not fully accounted for by pattern recognition. Scardamalia and Bereiter (1991) found that expert writers, compared to novice writers, discovered more problems with their own work and struggled longer to find solutions, revising both their goals and their methods more often than novices. Patel and Groen (1991) found that expert physicians spent more time *verifying* their diagnoses than did less experienced physicians. Physics experts are more likely than novices to verify the correctness of their method and result, and to actively change their representation of the problem until the solution becomes clear (Larkin, et al., 1980; Larkin, 1981; Chi, Glaser, and Rees, 1982). Expert programmers pay more attention to the goal structure of a task than novices, searching first for a global program design, while novices tend to be more "recognitional," plunging rapidly into a single solution (Adelson, 1984). In foreign policy problems, expert diplomats spent more time formulating their goals and representing the problem, while students primarily focused on the options (Voss, Wolf, Lawrence, & Engle, 1991). VanLehn (1998) found that less successful physics learners were more likely to solve new problems by analogy with old problems (a recognitional strategy), while more successful learners used general methods for solving new problems, drawing on analogies only when they reached an *impasse* or wished to *verify* a step in their solution. Chi, Bassok, Lewis, Reimann, & Glaser (1987) found that better performing physics students were more likely to generate self-explanations and self-monitoring statements than poor students. Glaser (1996) identifies effective self-evaluation and self-regulation as key components in the acquisition of expertise.

Tactical battlefield problems tend to be viewed differently by experts and by novices. Novices often regard them as puzzles, which have "school book" solutions, while more experienced officers view them in a more challenging light, acknowledging the possibility that the enemy may not succumb so readily to a predictable course of action. Serfaty, MacMillan, Entin, & Entin (1997) compared experienced Army planners to novice planners, and found that the experienced planners did not appear to use recognitional strategies; that is, they did not generate an initial plan more rapidly (e.g., based on similarities with prior situations), tended to see the situation as more *complex*, and felt the need for more *time* to think about their plan than novices. Among the distinguishing features of experts that Shanteau (1992) identified in his research was the ability to handle adversity, to identify exceptions, and to adapt to changing conditions (Shanteau, 1992).

If expertise develops along two paths, what is the nature of the second, non-recognitional path? One view distinguishes it sharply from the first path: Experts define and deal with challenging problems by substituting formal analytical methods for pattern matching. This is the general approach urged by decision analysts (e.g., Watson & Buede, 1987), who define *normative* methods that require breaking novel problems down into components parts (e.g., options, outcomes, goals), assessing them quantitatively, then recombining them in order to calculate a recommended decision. The research reviewed above, however, suggests that this characterization of the second path is wrong. Formal methods are both too time-consuming, and too divorced from the knowledge experts have accumulated (Cohen, 1993). Dreyfus (1997) puts it well: "Usually when experts have to make such decisions they are in a situation in which they have already had a great deal of experience. The expert, however, is not able to react intuitively, either because the situation is in some way unusual or because of the great risk and responsibility involved... the experts draw on their context-based intuitive understanding, but check and refine it to deal with the problematic situation... Deliberative rationality is detached, reasoned observation of one's intuitive practice-based behavior with an eye to *challenging and perhaps improving intuition without replacing it...*" [italics added].

Instead of dropping pattern recognition in novel situations, experienced decision makers learn to pause and *think critically about the results of recognition*. They ask, in effect: "What in this situation conflicts with my expectations? How can I stretch the pattern, i.e., tell a new story, to make the pattern fit? What assumptions must I accept to believe this story? What information is missing that would clarify the assumptions? How plausible is the story? What alternative patterns might apply? What story must I tell to make one of these other patterns fit, and what assumptions does it require? Which story is more plausible?" Reflective processes of this kind amplify the power and flexibility of recognitional processes without altogether throwing away their advantage in rapid access to knowledge. Moreover, critical thinking can make itself unnecessary the next time round. Decision makers sometimes handle novel situations by identifying regularities underlying exceptions to known patterns. Mental models embodying these newly discovered regularities provide patterns that can be recognized in later situations (Chi et al., 1981; McKeithen et al., 1981; Adelson, 1984; Larkin et al., 1980; Thompson, Cohen, & Shastri, 1997).

Because their function is to monitor and regulate recognition, we call the reflective processes used in unusual situations *metarecognitional*.<sup>2</sup> and we call this framework the Recognition / Metacognition Model (Cohen, Freeman, & Wolf, 1996; Cohen, Freeman, & Thompson, 1998). The R / M model implies that the two paths along which expertise develops are intertwined. Reflection increases the power of recognition, but itself gains power as a base of recognitional knowledge is built.

It is reasonable to suppose that expertise in *teamwork* evolves with increasing experience in a domain along the same two paths as expertise in *taskwork* (McIntyre & Salas, 1995). Yet Orasanu & Salas (1993) note that "most current team training aims at developing habits for routine situations... Habit and implicit coordination will carry people a long way in routine situations; we need to prepare them for the unusual." In this section we will explore how the dual nature of expertise sheds light on the tension between initiative and coordination in teamwork, and provides a framework within which both initiative and coordination can be trained.

### MENTAL MODELS UNDERLYING INITIATIVE

*Initiative* means taking "the first step, or the lead; the act of setting a process or chain of events in motion" (Brown, 1993). Extending this definition, we can define *degree of initiative* in terms of *when* in a chain of events someone intervenes and the amount of influence over the chain of events that person achieves: the earlier and more influential the intervention, the more initiative the person has shown with respect to that process. Interventions are often (though not always) targeted at the decision-action-outcome cycle of other agents. In business, for example, one may try to influence, predict, or react to the actions of competitors, customers, superiors, subordinates, or co-workers. In combat, one may try to influence, predict, or react to actions of the enemy, other friendly forces, superiors, or subordinates. In all these cases, greater initiative means that the decision-action-outcome cycle of other agents has been more thoroughly shaped in accordance with your own goals or purposes. The essential questions for training are: What must people know, and how must they think about what they know, to make appropriate decisions about initiative within an organization? What are the mental models and the critical thinking processes that underlie initiative?

The following analysis is based on 25 critical incident interviews and problem-solving sessions with active duty Army officers serving on operations, planning, and intelligence staffs at a variety of organizational levels (battalion, brigade, division, and corps).<sup>3</sup> The goal of our analysis was to uncover cognitive structure beneath the surface

---

<sup>2</sup> This name is by analogy to other so-called *metacognitive* skills, such as *meta-memory* (skills for monitoring and improving memory performance), *meta-attention* (skills for improving the control of attention), and *meta-comprehension* (skills for monitoring and improving the understanding of text). See Forrest-Pressley, MacKinnon, & Waller (1985); Metcalfe & Shimamura (1994); Nelson (1992).

<sup>3</sup> A total of 33 interviews and problem-solving sessions were conducted with active duty officers. These officers were located at Fort Stewart, Hunter Army Airfield, Fort Leavenworth, Fort Ord, and Fort Riley. We evaluated the 33 sessions for appropriateness to the goals of this project. Ten of the interviews (those at Fort Riley) were rejected because the brevity of the interview period (about one hour) did not yield sufficiently rich material to permit inferences about mental models and thinking strategies. The 23 sessions that we utilized each involved a half-day interview. Five of these involved officers who had held positions at the division level. Nine of the officers had held positions only as high as the brigade level. Seven of the officers had held positions only at the battalion level and two only at the regimental level. All

descriptions of the incidents. (For more details on this analysis, see Cohen, Thompson, Adelman, Bresnick, Tolcott, & Freeman, 1995.)

Structure was extracted in three successive stages: (1) We grouped judgments and decisions within the incident that occurred at the same time or in reference to the same event. We then classified these judgments and decisions by topic, using categories relevant to the domain, such as the higher level *purpose* of an operation, enemy or friendly *capabilities*, observation or analysis of *terrain*, enemy or friendly *intent*, enemy or friendly *action*, enemy or friendly *rate of movement*, *reliability* of an information source, and so on.

(2) We then identified clusters of such topics that tended to be associated with one another within and across incidents. For example, assessments of enemy intent were typically associated with assessments of relative force strength enemy, opportunities afforded by terrain, enemy doctrine or higher-level goals, and/or actual enemy actions. These correlated groups of concepts constitute a narrative, or *story*, about how certain aspects of a situation are expected to lead to certain decisions and certain kinds of events (Pennington & Hastie, 1993). We call these correlated groups of concepts, together with their implicit or explicit causal relationships, *mental models*. Figure 2 outlines an *enemy intent* mental model of this kind.<sup>4</sup>

---

individuals in the selected sessions served as G3's, Assistant G3's, XO's, or S3's, with the exception of one, who was a Fire Support Officer (FSO). Two of the participants described two incidents, yielding a total of 25 critical incidents or problem solving sessions.

<sup>4</sup> We do not mean to suggest that mental models exist as isolated structures. The mental model construct is simply a convenient way to isolate concepts that are meaningfully related and tend to co-occur. A more realistic (but less tractable) view would involve graded degrees of connection across the entire web of long term memory.

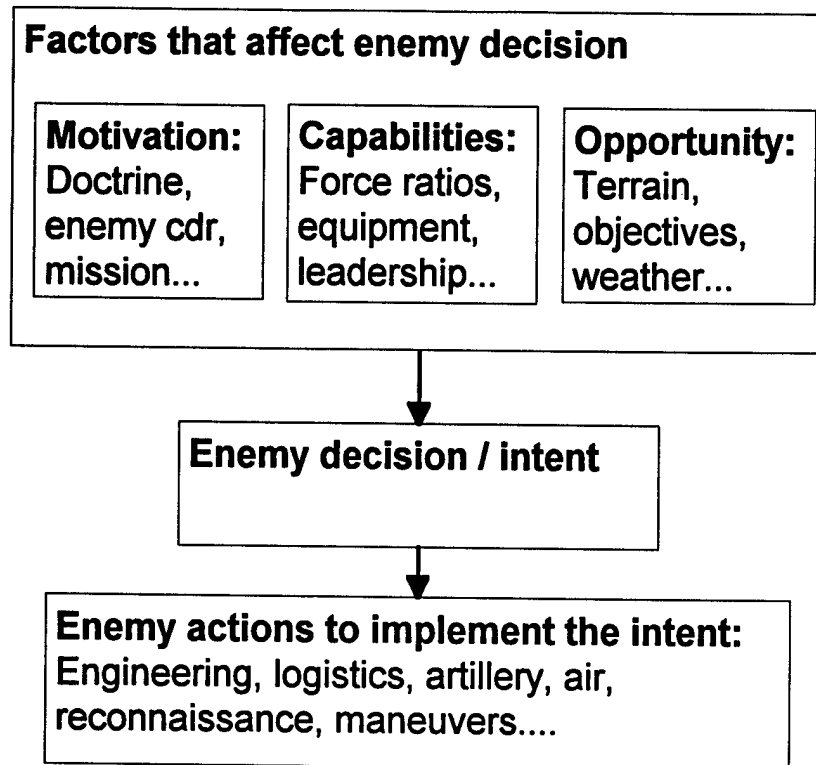


Figure 2. Components of *enemy intent* mental model.

Three types of mental model were defined to represent degrees of initiative, or *time orientation*. As shown in Figure 3, the three time orientations differ in terms of where and how they intervene in the chain of events representing another agent's decisions, actions, and outcomes. The *proactive* time orientation represents the maximum amount of initiative. It was present if a friendly action was designed to *influence* future enemy or friendly intent (e.g., to eliminate an enemy option or lure the enemy into a trap; to degrade the enemy's decision making process; to create an opportunity for a specific action by another friendly unit; or to influence a decision by your own commander). The *predictive* time orientation represents the next highest degree of initiative. It was present if a friendly action was adopted because a future enemy or friendly action was expected to occur (without our doing anything special to bring it about). Predictive actions include disrupting or defeating the planned enemy action; exploiting an enemy weakness or avoiding an enemy strength that will be caused by the enemy action; and preparing to provide support where and when other friendly forces are likely to need it. The *reactive* time orientation represents the least amount of initiative. It occurred when a friendly action was adopted because of an enemy or friendly action already accomplished or underway (e.g. to limit the damage from a surprise attack; to take advantage of an enemy blunder; or to rescue a friendly unit in trouble).<sup>5</sup> The three time orientations are not mutually exclusive. A decision maker might be reactive at one level but proactive and/or

<sup>5</sup> The same concept of initiative could also be applied to intervention in natural chains of events, e.g., proactively preventing a hurricane by seeding a tropical storm, predicting and preparing for the hurricane's point of impact, or reacting by declaring a state of emergency after it hits.

predictive at other levels, with respect to other decision cycles that belong to the same or different agents.

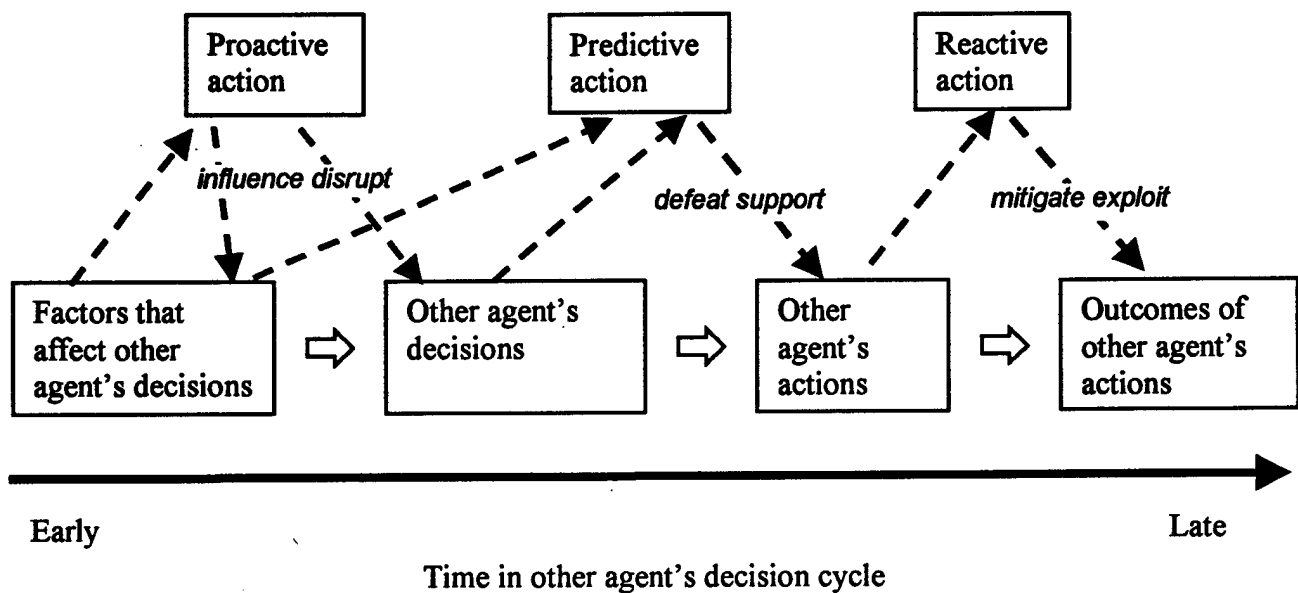


Figure 3. Three different time orientations differ in where and how they intervene to cause changes in another agent's decision cycle.

(3) The third stage of analysis involved examining correlations of mental models and time orientations with one another and with other variables. To score the presence of a mental model in the description of a particular incident, we did not require the presence of all components of the model as defined in step 2. We did require the explicit mention of two or more out of the cluster of correlated topics associated with that kind of model, as indicated in Table 1.

**Table 1. Types of mental models, criteria used for their identification, and the percentage of incidents containing at least one example of a mental model fitting the criterion.**

<b>Mental Model</b>	<b>Criterion -- To score mental model as present, description of incident must include mention of the following:</b>	<b>% of incidents (n=25)</b>
<b>Intent</b>	(i) Enemy or friendly intent and (ii) two or more other concepts, i.e., factors affecting the decision to adopt intent or actions taken to implement the intent	80
Friendly intent		64
Enemy intent		56
Friendly & enemy intent		32
<b>Proactive time orientation</b>	(i) A friendly action designed to (ii) influence future enemy or friendly intent or decision making process	32
<b>Predictive time orientation</b>	(i) A friendly action adopted because of (ii) a prediction of future enemy or friendly intent, strength, or weakness	56
<b>Reactive time orientation</b>	(i) A friendly action adopted because of (ii) an enemy or friendly action that is already accomplished or underway	12
<b>Purpose</b>	(i) Friendly intent that is motivated by (ii) a higher-level or longer-term objective or general principle of warfighting, extending beyond the immediate mission	36
<b>Action sequence</b>	(i) Two or more enemy actions or two or more friendly actions (ii) with the explicit constraint that one must be performed before the other	52
<b>Rate of movement</b>	(i) Estimate of rate of enemy or friendly movement and (ii) two or more factors influencing that rate (e.g., slope, firmness of terrain, type of equipment)	28
<b>Reliability</b>	(i) A claim or prediction re the situation or a recommendation re course of action, (iii) its source, and (iii) an assessment of the reliability of the source	76
<b>Alternative causes/effects</b>	(i) An event (e.g., an enemy action) and (ii) two or more competing causal explanations of the event, or two or more competing causal consequences of the event	28
<b>Evidence interpretation</b>	(i) A claim, (ii) mention of one or more pieces of direct evidence for the claim, and (iii) one or more reasons for or against the soundness of inferring the claim from the evidence	16

We can visualize this higher level of structure spatially by applying non-metric multidimensional scaling to the mental models, time orientations, and other variables (Kruskal, 1964). The closer any two items are situated in Figure 4, the more highly correlated they were across incidents. In addition to mental models and time orientations, two variables are also shown: officers' experience and the degree to which an incident surprised them.

Initiative serves a useful organizing principle for the mental models in this space. Hierarchical cluster analysis (Johnson, 1967) of the correlations in Figure 4 reveals three basic clusters of mental models, and these correspond to the three time orientations: *reactive*, *predictive*, and *proactive*. The two dimensions shown in Figure 4 are suggestive. They are anchored on the three clusters, and provide a natural interpretation of the contribution of different mental models to initiative. One dimension reflects *when* uncertainty about another agent's action is reduced (early versus late), and the other reflects *how* it is reduced (by assessment or by action).

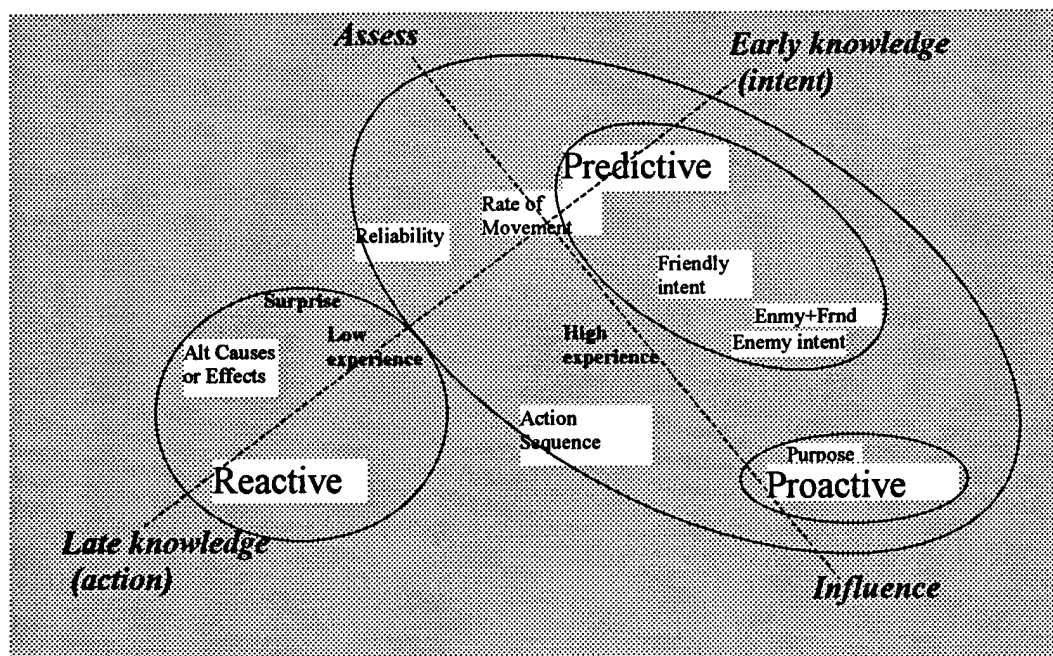


Figure 4. Proximity in this space represents degree of correlation among mental models (white boxes), time orientations (white boxes), and two variables (low/high experience and surprise by the enemy). Ovals show high-level structure derived by a hierarchical clustering algorithm. Italicized labels and dotted lines are a suggested two-dimensional interpretation of this space.

Table 2 shows the different profiles of mental model use that characterize the three time orientations. Being proactive was associated with thinking deeply about objectives, i.e., using mental models of higher-level *purpose*. The proactive time orientation was also more closely associated with mental models of the *enemy's intent* than were predictive or



reactive orientations. These associations are consistent with (but not logically entailed by) the interpretation of *proactive* decision making as the attempt to shape the intent of others in accordance with one's will.

Table 2. Pearson correlations across incidents between proactive, predictive, and reactive time orientations and other mental models. Note that both statistically significant correlations and trends are italicized.

	Proactive	Predictive	Reactive
Purpose	.557 * ( <i>p</i> =.004)	-.175	-.021
Enemy intent	.435 * ( <i>p</i> =.030)	.188	.079
Friendly intent	.336 ( <i>p</i> =.101)	.510 * ( <i>p</i> =.009)	.021
Both e & f intent	.265	.263	-.253
Action sequence	.263	.026	-.169
Rate of movement	-.103	.435 * ( <i>p</i> =.030)	-.253
Reliability	-.016	.257	.208
Alt. causes/effects	-.237	-.165	.318 ( <i>p</i> =.121)

*Predictive* decision makers were more likely to develop mental models of *their own intent*, e.g., justifying their plans by considering relative force strength and opportunities afforded by terrain. Predictive decision makers were also more likely to use the *rate of movement* mental model, e.g., to anticipate their own or the enemy's future location ( $r = .435$ ;  $p = .030$ ). The use of *both* friendly and enemy intent models was about equally likely for predictive and proactive decisions.

Mental models of *reliability* were used both in the predictive orientation (to evaluate predictions ahead of time) and in the reactive orientation (to figure out why a prediction failed). *Alternative causes and effects* were considered most often in reactive modes, when decision makers tried to explain a failed expectation.

In sum, concepts in this domain appear to be organized into a set of mental models, including *purpose*, *intent*, *action sequence*, *alternative causes and effects*, and *reliability*. These models in turn are organized around a set of more fundamental principles pertaining to the time and manner in which uncertainty about other agents is reduced (the axes and clusters depicted in Figure 4). Reactive, predictive, and proactive time orientations represent increasingly influential interventions in another agent's decision cycle. Thus, moving horizontally from left to right in Figure 4 affects both how and when intervention takes place, and represents increasing *initiative*.

Initiative in this sense is correlated with experience. As Figure 4 indicates, when decision makers advance from low to high experience, they tend to move from the cluster of mental models associated with reacting to unexpected events, to the cluster containing predictive and proactive strategies. Figure 5 provides a more detailed look at the differences in mental model use between more and less experienced officers. In our sample of officers, command staff experience ranged from 0 to 64 months, with a median of 21 months. Figure 5 shows the mental models that were used at least 30% of the time by officers above the median level of experience and those that were used at least 30% of the time by officers below the median. Significant differences occur, as expected, at the

extremes of high and low initiative. More experienced officers were twice as likely to consider mental models of *purpose* as less experienced participants (Figure 6;  $p = .056$ ). Less experienced officers, however, were more likely to be surprised ( $p=.010$ ). It remains now to consider how these mental models are used in action.

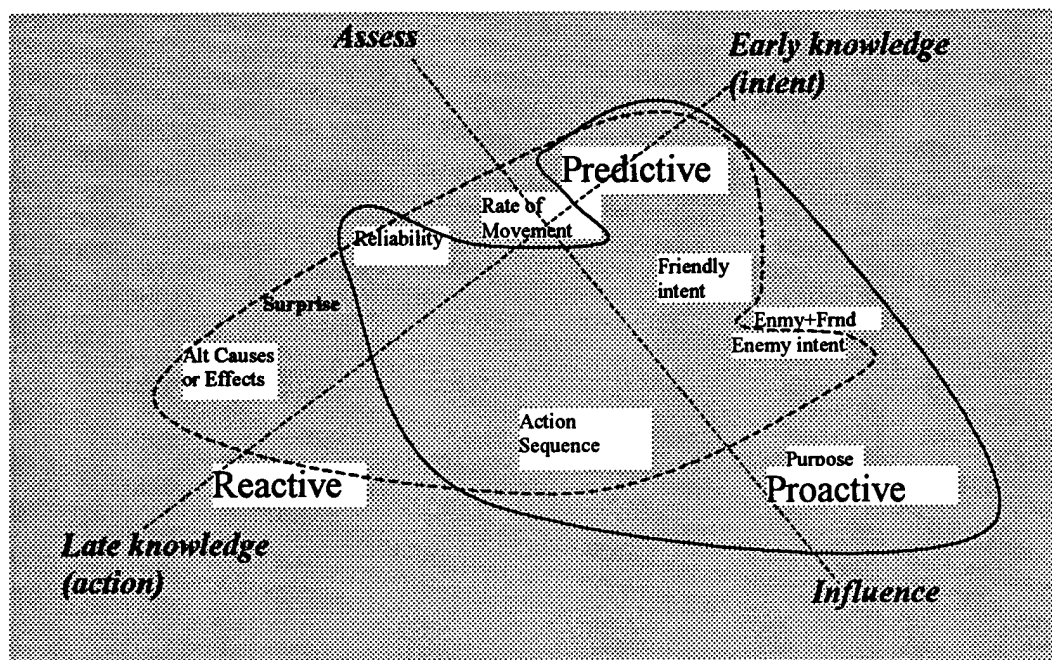


Figure 5. Mental models used in at least 30% of incidents by more experienced (solid line) and less experienced (dashed line) officers.

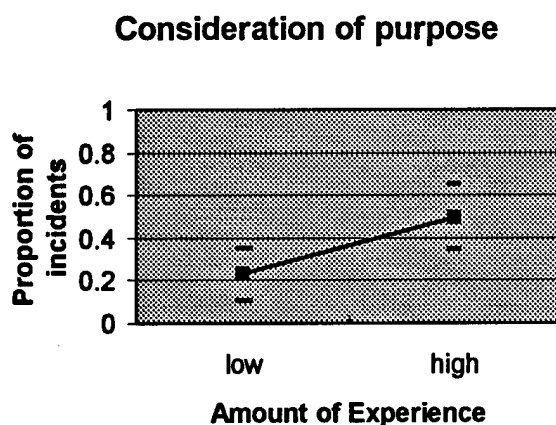


Figure 6. Tendency of experienced officers to consider high level purpose more often than less experienced officers.

## CRITICAL THINKING ABOUT MENTAL MODELS

In successful recognition, perceptual inputs and goals rapidly converge within a decision maker's mind onto one, and only one, stable "intuitive" decision. The basis for decision making, more often than not, is recognition, and in ordinary circumstances, the recognitional responses of experienced decision makers are likely to be adequate (Klein, 1993). In more unusual situations, however, recognition needs to be supplemented by other processes.

Recognitional learning enables humans (and other animals) to acquire adaptive responses to environmental conditions that arise with some regularity during a single lifetime, even when they have not appeared in the previous history of the species. At this scale, the effect of natural selection on inherited stimulus-response connections would be far too slow. On the other hand, recognitional skill may itself take many years to reach the expert level in a particular domain (Ericsson, 1996); how long it takes is likely to depend on the extent of the environmental variability that must be mastered. *Critical thinking* provides a further gain in flexibility in rapidly changing or novel environments, where recognitional learning is itself too slow. Critical thinking enables decision makers to find adaptive responses to even finer-grained environmental variations, which may not have appeared at all in the previous experience of the decision maker. It does so by building a relatively simple layer of control over the recognitional processing that is already taking place.<sup>6</sup> The simplicity of the required control processes (described below), along with their power, lends plausibility to the hypothesis that such a second-order capability could have evolved, and that specific skills drawing on that capability could be shaped by experience.<sup>7</sup>

Critical thinking includes *meta-recognitional* processes that monitor and regulate recognition. As shown in Figure 7, the Recognition / Metacognition model distinguishes three basic metacognitive functions: (1) The *Quick Test*, which is a rapid assessment of the value of taking more time for critical thinking versus acting immediately on the current recognitional response; (2) *critiquing* the current results of recognition in order to identify problems; and (3) *correcting* those problems by influencing the operation of the recognition system. Previous descriptions of the R/M model may be found in Cohen, Freeman, & Wolf (1996) and Cohen, Freeman, & Thompson (1998; see also Cohen, Parasuraman, Serfaty, & Andes, 1997).

---

<sup>6</sup> This hypothesis regarding the evolutionary origin of metacognitive control is consistent with the views of Campbell (1974), Simon (1962), Heylighen (1991), Turchin (1977) and others. Knowledge systems evolve through a process of variation and selection, which favors changes that improve the system's ability to maintain itself in the presence of environmental variability. The complexity of the system increases along with the variety of different situations it can distinguish and responses it can produce. This increase in complexity is self-limiting, since it magnifies the time required to learn the appropriate situation-response connections. A solution is to increase the variety of potential responses indirectly, by varying higher-level parameters – in short, to introduce a system that varies the constraints on the original lower-level system. This higher-level system itself adapts through variation and selection, and thus explores a vast space of lower-level configurations without disrupting the operation of the lower level system.

<sup>7</sup> The hypothesis that meta-recognitional strategies can be learned through experience is being tested by experiments with a computational implementation of the Recognition / Metacognition model. The implementation utilizes a connectionist architecture with a backpropagation learning algorithm, and employs temporal synchrony of firings for consistency of object reference in relational reasoning (Thompson, Cohen, & Shastri, 1997).

A fundamental meta-recognitional skill is distinguishing *grounds*, i.e., what is given in a particular situation, from *conclusions*, i.e., what is inferred or decided in that situation (Kuhn, Amsel, & O'Loughlin, 1988). For example, the observation that a missile site is active may lead very rapidly to the recognitional conclusion that the enemy intends to fire a missile and also to the decision to strike the missile site. This must be a real-time discrimination, because the same event may serve as evidence in one situation (e.g., the missile site went active) and as a recognitional conclusion in another (e.g., intelligence that the enemy intends to fire at a U.S. ship might lead to a prediction that the missile site will go active).

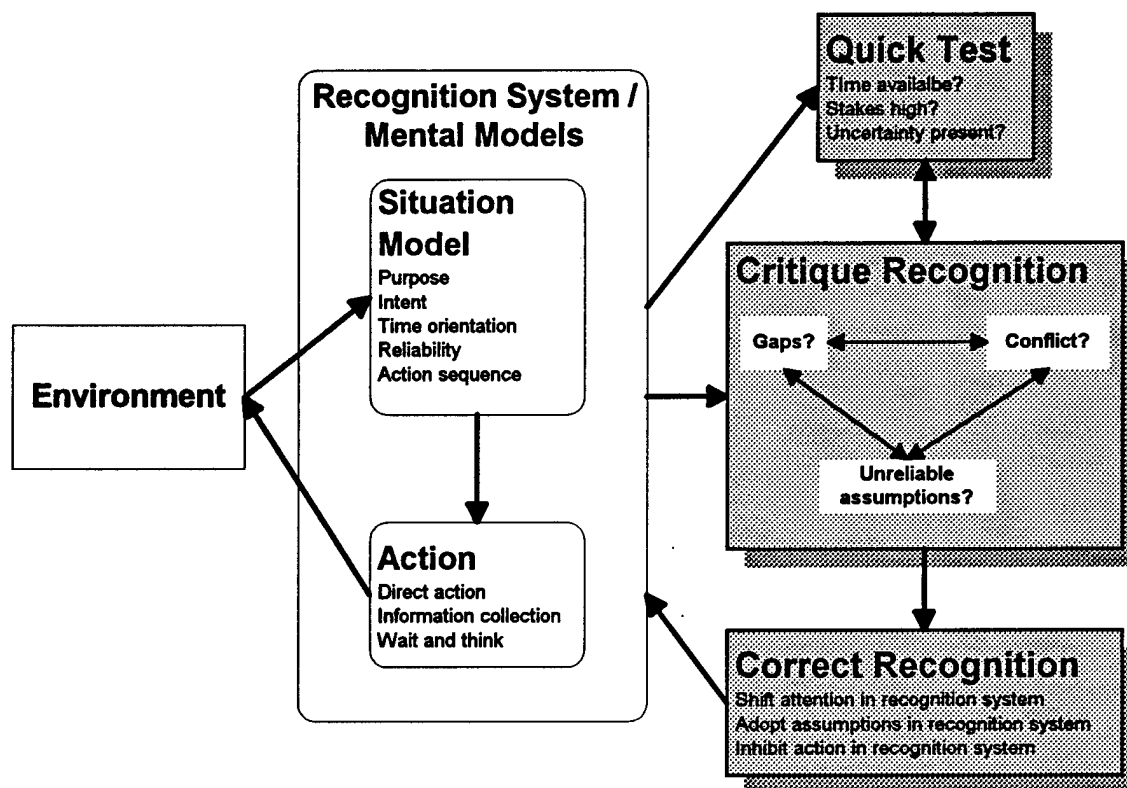


Figure 7. Basic components of the Recognition / Metacognition model. Shaded components are meta-recognitional.

The relationship between grounds and conclusion on a particular occasion is an *argument* (Toulmin, 1958), which may or may not be compelling. Meta-recognitional processes focus on the credibility of *recognitional* arguments (other types of arguments are based on principles other than recognition, e.g., logic, theory, or expert authority). In critiquing, the decision maker looks for *uncertainty* in the arguments composing the present recognitional conclusion. There are three ways that recognition can fall short, i.e., ways in which it can fail to produce one and only one stable conclusion. These three kinds of uncertainty correspond to situations in which (i) *more than one* conclusion seems plausible, because of *gaps* in knowledge or values, (ii) *less than one* (that is, *no*) conclusion seems entirely plausible due to *conflicting* beliefs or values, or (iii) the

conclusion is subject to *variation* over time, because of shifting, *unreliable* assumptions about beliefs or values.<sup>8</sup>

Critical thinking addresses these problems by removing one major limitation on recognitional learning: that the situation and the response retrieved to handle it must have been closely associated in the individual's previous experience. The mechanisms that overcome this limitation involve relatively simple processes of controlled attention.<sup>9</sup> One important meta-recognitional correcting step involves shifting attention from cues in the situation to selected elements of the current recognitional conclusion. The result is activation of potentially relevant knowledge in long-term memory that has not played a role in the present argument because it is too distantly related to the situational cues. Activation of this new information may lead, via recognitional processes, to activation of still more indirectly related knowledge, to which attention may then be shifted, and so on. Such attention shifting is equivalent to *posing queries* about the acceptability of the currently active situation model and plan (Shastri & Ajjanagadde, 1993; Thompson, Cohen & Shastri, 1997).

A more directive variant of attention shifting is to *persistently* attend to a *hypothetical* or *counterfactual* action or event. Persistent attention to such a possibility is equivalent to assuming or imagining that it is true, and posing a query about what *would* happen if the hypothesized action or event were the case (Ellis, 1995). This strategy extends the reach of recognitional processing even further, by activating relevant knowledge that is not closely associated either with cues in the actual situation or with the recognitional conclusion.

The result of attention shifting strategies of either kind is always to increase (or at least never to decrease) the amount of knowledge brought to bear on a problem.<sup>10</sup> Attention shifting, however, operates in different ways and has different consequences in response to different types of uncertainty (Figures 8 and 9). It is likely that experienced decision makers learn meta-recognitional strategies that reflect these differences:

- To identify and fill *gaps* in an argument (the case where more than one conclusion is consistent with the current evidence), attention shifts to one of the possible conclusions – in effect, querying its truth. The result is activation of an associated *mental model*, which indicates the types of information that have been useful in the past in determining the truth or falsity of the attended conclusion. (For example, in

---

<sup>8</sup> Similar classifications of types of uncertainty distinguished by decision makers in actual problem solving episodes are described in Lipshitz & Strauss (1997) and Orasanu and Fischer (1997).

<sup>9</sup> The classic account of attentional control processes is in Atkinson & Shiffrin (1968).

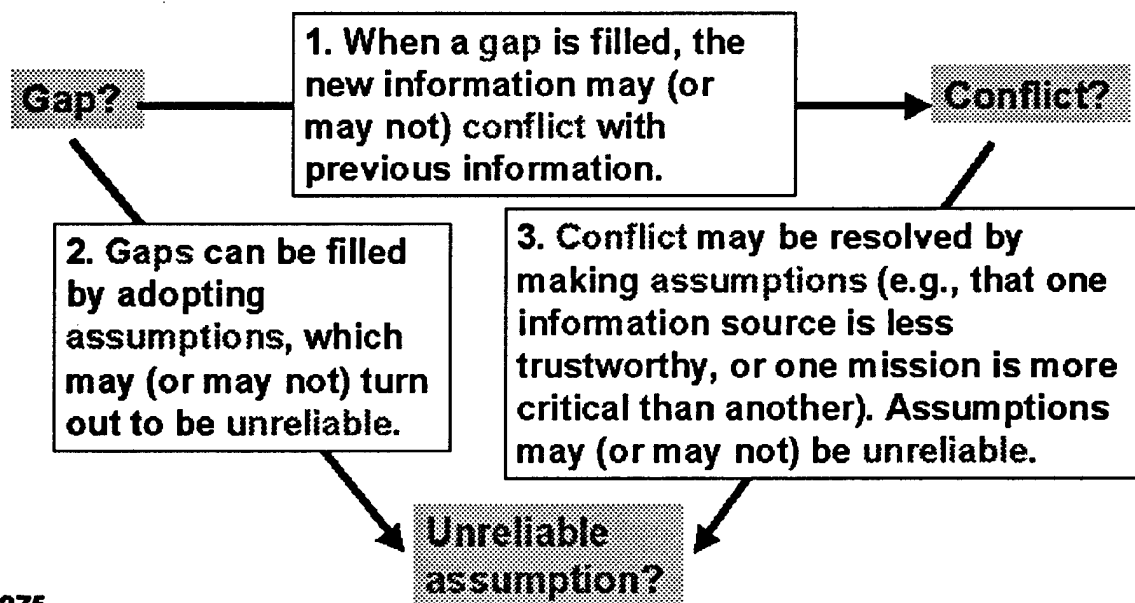
<sup>10</sup> It is probably a mistake to equate attention with consciousness. First, meta-recognitional control processes may take place relatively automatically with experience. Second, one can be conscious of events for which no explicit attention is required. It is more plausible (but still quite speculative, of course) to suppose that consciousness can be an indirect *result* of attention shifting. Attention involves querying the contents of perception or long term memory. When the activation from the query reaches relevant material, it returns to the queried node, creating a resonating cycle (Shastri and Ajjanagadde, 1993). Consciousness may be the result of a positive feedback process by which major parts of the brain are recruited within such activation cycles. This is consistent with Ellis' (1995) view of consciousness as requiring the synchronization of activities in different parts of the brain.

order to determine the *intent* of an enemy unit, it is useful to consider the *capabilities* of that unit, as well as its *opportunities*, *goals*, and *actions*.) Attention then shifts to one of the components of the activated mental model for which information is not currently active (e.g., the decision maker decides to think about the *capabilities* of the enemy unit whose intent is uncertain). The result may be retrieval of relevant information in long-term memory about that component, or, if relevant information is not retrieved, a decision to initiate external data collection.

A more directive strategy for activating relevant knowledge in long-term memory is to temporarily assume that a conclusion is correct, by persistent attention to that possibility. This and subsequent shifts of attention may activate less immediately accessible information about the likely long-term consequences of an option, or about the less obvious implications of a hypothesis.

## Cycles of Critiquing & Correcting

It is not unusual in critical thinking that solving *one* problem leads to finding *another* problem. For example:



275

Figure 8. Slide from critical thinking training (see Section 4) illustrating iterative nature of cycles of critiquing and correcting. Correcting one kind of problem can sometimes lead to other problems.

Knowledge activated by these attentional strategies may help narrow down the set of plausible conclusions (i) by showing that one or more of the conclusions *conflicts*

with existing goals or beliefs, or (ii) by uncovering the relevance of new goals or beliefs that further *constrain* the solution. There are three possible outcomes of these correcting steps. First, if newly activated knowledge eliminates all but one plausible conclusion, the problem is solved, i.e., there is now one and only one stable conclusion. Second, the result may be a new problem, *conflict*, if *no* conclusion appears to satisfy all the newly discovered constraints. Third, the result may be another kind of problem, *unreliability*, if the elimination of options is the result of as yet unconsidered assumptions rather than firm knowledge. (See Figure 8.)

- One method for identifying *conflict* is to fill gaps as just described. Newly retrieved or collected information may expose hitherto hidden conflict between a conclusion and existing goals or beliefs. Another, more directive strategy for identifying conflict is to temporarily assume (by persistent attention) that a conclusion is *wrong*, in effect tasking the recognition system to activate an account of how that could happen. This tactic heightens the salience of negative information about the conclusion, e.g., possible bad outcomes of an option or reasons why a hypothesis might not be the case. Awareness of this information may have previously been suppressed by stronger positive information.

Conflict among arguments (the situation in which there are grounds for both accepting and rejecting every conclusion) can be addressed by shifting attention to the sources of information or to the goals that are responsible for the conflict. As a result of this shift in attention (and subsequent shifts to which it leads), it may be learned, for example, that (i) one or more conflicting sources of information are not as credible as previously supposed, (ii) one or more sources of information was misinterpreted in some way, (iii) one or more conflicting goals are not as important as previously supposed, or (iv) one or more options does not in fact conflict with a goal as previously thought. In this case, additional knowledge *removes* constraints on the recognitional conclusion, rather than adding constraints as in the case of filling gaps. Attention shifting reveals that what was previously thought to be a constraint on belief or action (e.g., a report from an information source, or a goal) was based on assumptions (Doyle, 1979; Cohen, 1986).

In the more directive version of this correcting step, the decision maker temporarily assumes (by persistent attention) that one of the conflicting conclusions is *correct* despite the information or goals that conflict with it, thus tasking the recognition system to activate an account of how this could be. Alternatively, the decision maker assumes that a specific source is not credible, or a specific goal is not important, etc., tasking the recognition system to account for how this could be. Such directive techniques can increase the chance that hitherto inactive knowledge in long-term memory about the relevant sources or goals will be retrieved.

There are three possible results of these correcting steps. First, the problem is solved if newly activated knowledge convincingly undermines the original reason for rejecting one and only one of the competing conclusions. For example, newly activated knowledge may establish that one of the conflicting information sources is

not credible or that one of the conflicting goals is not important. Second, these correcting steps might resurrect more than one conclusion, by undermining the reasons for rejecting them, thus leading back to the problem of gaps in arguments. Third, these correcting steps may lead to *unreliability*, if the activation process does not actually refute the initial assumptions but simply reverses those assumptions. Acceptance of one and only one conclusion will then depend on the *possibility of imagining* that a particular information source is not credible or that a particular goal is not important. Conclusions based on possibility in this way are, of course, subject to change. A decision maker may or may not be explicitly aware of such assumptions. (See Figure 8.)

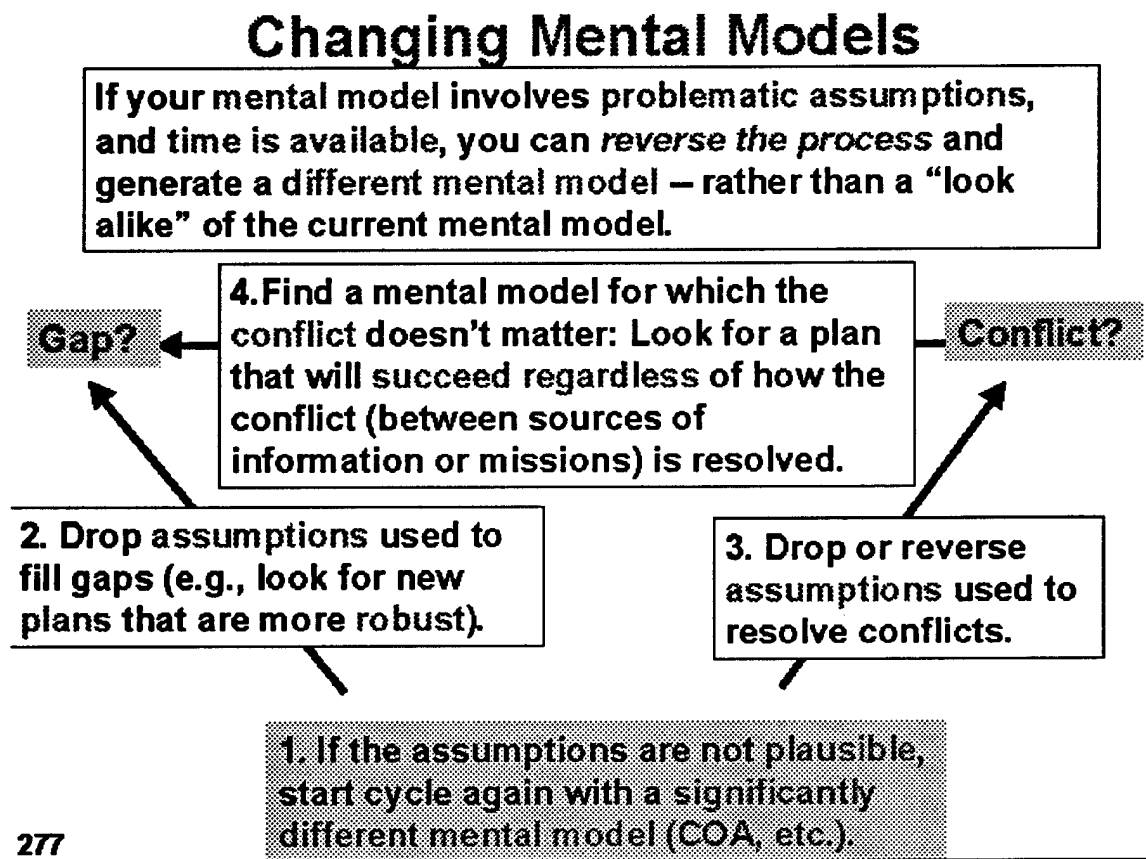


Figure 9. Another slide from training, illustrating iterative nature of critical thinking. When assumptions are judged implausible, decision makers may drop them and look for another mental model.

- To address *unreliability*, a decision maker must first *identify* key assumptions underlying possible conclusions and then *evaluate* them. Identification of hidden assumptions is not trivial. A decision maker may have a high degree of confidence in the initial recognitional response to a situation, and yet that conclusion may turn out to depend on questionable assumptions, for example, that the present situation



resembles previously experienced ones in important respects. In addition, as we have seen, when the initial recognitional response is uncertain, correcting steps to fill gaps or resolve conflict can smuggle in assumptions that are not even noticed by the decision maker. Instability of conclusions over time, or variability in the conclusions of different decision makers at the same time, are symptoms that unreliable assumptions could be playing a role. However, (a) variability per se does not indicate *what* the problematic assumptions are, and (b) variability is not always available as an indicator.

In a group context, a strategy for identifying assumptions is for decision makers to articulate *reasons* for their divergent conclusions and then to compare these justifications. Openness to such a dialogue is, of course, a natural part of a healthy group decision making process (e.g., Helmreich & Foushee, 1993). When variability does not exist, because there is a single convincing conclusion, disagreement can be induced more artificially, by assigning some individuals the task of "red-teaming" the preferred conclusion or playing the role of devil's advocate. Each potential problem discovered in this way represents an assumption implicit in the favored solution, to the effect that the relevant problem will not materialize.

Skilled decision makers use attention-shifting strategies to simulate these group processes. No matter how confident they are in a particular conclusion, one powerful approach is to assume that it is *incorrect* (through persistent attention to that possibility), in effect querying the recognition system for an explanation of how that could be. If they are persistent enough, an explanation for the falsity of the prediction or the failure of the plan will be generated. Decision makers may then imagine that this is not the correct explanation for the failure, and force the recognition system to activate another explanation, and so on. Each explanatory possibility activated in this way corresponds to an assumption. If the decision maker expects the preferred conclusion to succeed, the decision maker must be comfortable assuming that each possibility of failure that can be generated is false.

Assumptions can sometimes be evaluated one by one as they are identified, by shifting attention in order to activate knowledge that bears on their plausibility. However, because of limitations on time, only a small number of assumptions can be dealt with directly in this way. Therefore, the mere fact that a conclusion depends on untested assumptions is not sufficient cause to reject it. In the novel situations where critical thinking is appropriate, some crucial information will inevitably not be available, and no conclusion will fit all the observations or goals perfectly. If gaps and conflicts are to be resolved at all in these cases, it will have to be by means of assumptions. In fact, real-world decision makers often use an *assumption-based correcting strategy*. They attempt to fill gaps and resolve conflicts in a recognitional conclusion, by retrieving or collecting information if possible but by making assumptions where necessary, until they have a *complete* and *coherent* story. In effect, they ask themselves, "What is the best story I can tell to justify this inference or plan?" They then step back, take a look at the story they have created, and try to evaluate its plausibility *as a whole*. In particular, they ask, "How many truly

different assumptions did I have to make to build this story? Are the assumptions I had to make credible in this situation?" If the assumptions are troubling, the decision maker may temporarily drop them, and start again with the gaps and/or conflict that the assumptions were intended to handle. (See Figure 9.) The result may be a new story, supporting a different conclusion. The choice between competing hypotheses or actions is often made based on evaluation of the plausibility of the assumptions underlying competing stories (Pennington & Hastie, 1993).

As the preceding discussion makes clear, meta-recognitional processing is a highly iterative, open-ended, and flexible process. The solution to one type of problem (e.g., filling a gap) can lead to another type of problem (e. g., conflict), which prompts new correcting steps, leading to new problems (e.g., unreliable assumptions), and so on. In the course of this process, recognitional conclusions are improved and/or modified bit by bit through local decisions about what to do next, and an understanding of the strengths and weaknesses of alternative conclusions is developed at the same time. These improvements are accomplished across cycles of shifting attention that either activate long-term memory contents that lay beyond the reach of a single recognitional cycle or lead to external information collection. When further benefits are likely to be outweighed by the costs of additional delay, critical thinking stops, and the decision maker can act immediately on the current best solution to the problem.

In most of these respects, meta-recognitional processing contrasts with formal analytical approaches to decision making. Typically, formal methods require a problem structuring stage which specifies in advance the inputs that will be used to model the problem (e.g., Watson & Buede, 1987). The required inputs are not related in any direct way to recognitional responding and the knowledge that it taps, yet decision makers must somehow make precise numerical assessments of variables such as the strength of evidence and importance of goals. Similarly, the steps required to generate outputs from the inputs are determined in advance by the choice of an analytical model. Although some iteration may take place, "thinking" is largely over (and a solution is available) as soon as, but not a moment before, the model is finished according to the prespecified blueprint. Finally, the output is typically an unrealizable statistical abstraction (e.g., "there is a 70% chance of enemy attack"; "the expected utility of option A is equal to 40"), rather than a coherent picture of the situation that can be visualized and planned for. Table 3 compares the view of thinking offered by the R / M model and by analytical and recognition-based models, respectively.

Table 3. Comparison of three paradigms for understanding decision making.

	Analytical Models	Recognitional Models	Recognition / Metacognition Model
<b>Inputs</b>	Identify all inputs in advance (exhaustive specification of hypotheses, cues, outcomes, goals)	Limited to previously experienced situations and associated responses	Activate knowledge about new hypotheses, options, cues, or goals as current ones are found wanting
<b>Processing</b>	Assign fixed, precise meanings to cues & mathematically aggregate by a set of predetermined steps	Rapid, intuitive, not easily explained or justified	Try to create complete, consistent, and reliable situation picture by dynamically modifying interpretation of cues & goals
<b>Outputs</b>	Unrealizable statistical aggregation	Concrete situation picture, but little insight into its strengths & weaknesses	A single concrete situation picture, with an understanding of its strengths and remaining weaknesses

### CRITICAL THINKING AND INITIATIVE: AN EXAMPLE

As we have seen, initiative is a matter of *timeliness*: acting early enough to influence another agent in accordance with one's own purposes. Yet, as we have also seen, critical thinking takes more time than simple recognition. It is reasonable to ask, then, whether critical thinking is inconsistent with the tempo of decision making demanded by initiative. In fact, the opposite is the case. Rapid recognitional responding can, in some situations, take more time rather than less. It can trap a military decision maker in a reactive mode with respect to the enemy, or trap a business decision maker in a reactive mode with respect to competitors and customers. Seizing the initiative will often be impossible in the absence of critical thinking about innovative solutions that bypass standard procedures.

In the following section, we describe an actual incident through the eyes of a participant (Our description is based directly on the transcript of an interview obtained in research cited in Kaempf, Klein, Thordsen, & Wolf, 1996). This incident is an excellent illustration of how critical thinking about mental models can be necessary to support initiative, and how the time cost of critical thinking can easily be dwarfed in comparison to the advantages of the proactive tactics to which it leads.

#### Initial recognitional response

A U.S. naval officer was serving as the Anti-Air Warfare Coordinator (AAWC) on an Aegis cruiser in the Persian Gulf, when he received intelligence reports that an Iraqi Silkworm missile site had suddenly gone active. The site was a threat to a large number

of U.S. surface ships assembled in the area at the start of the air war against Iraq. Unfortunately, no airborne strike aircraft were close enough to be used against the missile site. The first thing that occurred to the AAWC, i.e., his *recognitional response*, was the standard procedure for this situation: Ask the Tactical Operations Officer (TAO) on his own cruiser to call the Battle Force TAO and request that strike aircraft be launched from the carrier to destroy the newly activated missile site.

*Quick Test:* The AAWC was initially in a *reactive time orientation* with respect to the Iraqi missile site's turning on its fire control radar. Whatever he chose to do was designed to mitigate any advantage the enemy might derive from that surprise move. His *purpose*, however, quickly became *proactive* with respect to the enemy's launching a missile, an option that he wished to eliminate. The question, then, was: Will the standard procedure be effective and timely in destroying the missile site as quickly as possible? Rather than immediately carrying out the standard procedure, the officer paused momentarily to critically evaluate it.

### Critiquing the initial recognitional response

*Find conflict:* One problem with the recognitional response came to mind immediately, based on a mental model of *team member reliability*. The officer recalled a previous experience when carrier staff failed to take into account updated information about target coordinates. *Resolve conflict by adopting an assumption:* Rather than immediately give up the initial recognitional response, the AAWC tried to repair it as well as he could. The standard procedure would be justified if the AAWC could assume that this situation was in crucial ways different from the previous one. *Evaluate assumption:* In fact, there was a difference: He was able to provide the required targeting information earlier now than he had on the previous occasion. Despite this difference, the AAWC believed that the magnitude of the previous error indicated a strong possibility that the deck-launched intercept would not be properly targeted. He was not comfortable with the assumption.

*Fill gaps by retrieving information:* The AAWC was also concerned about the speed with which a missile strike could be implemented, so he decided to scrutinize the recognitional response further. He imagined that the standard procedure was adopted, stepped through the expected *action sequence* in his imagination, and looked for problems (Klein, 1993). In doing this, he drew on mental models not only of *action sequence*, but also *team member reliability* and *purpose*. He predicted that the Battle Force AAWC would pass the request to the Battle Force TAO, who would probably bring in the Commander, because the typical lieutenant commander standing TAO watch "didn't want to be responsible for... big decisions." If permission was granted by the commander, the Battle Force staff would then have to contact the carrier, initiating a new process that would itself take a number of minutes. Moreover, the process might take even longer than usual because the carrier was about to launch other aircraft. *Find conflict:* The AAWC's expectations regarding the standard procedure conflicted with the *purpose* of timely, proactive response to the missile site.

*Resolve conflict by adopting an assumption:* Even now, the AAWC was not ready to abandon the initial recognitional response. To defend the standard procedure in the face of this problem, the AAWC tried to construct the best possible story; in effect, the AAWC imagined that the standard procedure was a success, and asked how that could be.

The AAWC concluded that for the standard option to be acceptable, he would have to assume that the Iraqi missile site had switched on its fire control radar without the intent to launch a missile. *Evaluate the assumption:* While this was possible (for one thing, they had previously launched a missile without turning on their radar in advance), it was certainly not guaranteed. To assume the enemy would not fire meant adopting a *predictive* time orientation, which depends on assumptions about what the enemy will do, rather than a *proactive* orientation, which influences what the enemy can do. He was not comfortable with this assumption either. *Quick test:* The AAWC chose not to consider enemy intent any further. Taking more time to think critically about enemy intent was unnecessary in this situation. (This judgment contrasts sharply with the behavior of officers in non-wartime or low intensity conflict situations, where inferring hostile intent can play a major role in the decision to engage a target. These officers use critical thinking to fill gaps and resolve conflicts in an *enemy intent* mental model, and often consider *alternative possible causes and effects* of an unexpected and possibly hostile enemy action. The mental models that critical thinking focuses on vary with the circumstances. See Cohen et al., 1996.)

*Resolve conflict by finding another option:* The Anti-Air Warfare Coordinator voiced misgivings to his own staff, including an Air Intercept Coordinator (AIC) whom he regarded as "outstanding." The AIC suggested another option just as the AAWC was thinking of it himself: An Armed Surface Reconnaissance (ASR) plane already in the air might be able to take out the missile site. *Quick Test:* This option also was subjected to critical scrutiny, since it was a departure from standard procedure. This option, too, was not without problems.

### Critiquing the new option

*Fill gap by collecting information:* One problem was immediately apparent: Was the ASR well enough armed to carry out this unusual mission, and was it willing to do so? The AAWC and AIC contacted the ASR to find out, and the ASR crew responded that they could and would undertake the mission. *Find conflict:* A second problem had to do with the violation of standard operating procedures: A reconnaissance aircraft had never before been used under the control of an Anti-Air Warfare officer for a ground strike mission. *Resolve conflict by adopting assumption:* The AAWC chose to assume that he had the authority to retask the ASR, since he was the officer in control of the airspace. *Evaluate the assumption:* The AAWC was comfortable with this assumption. The Captain of his cruiser had established an atmosphere that encouraged initiative: "If I had a different kind of captain that had a different type of mentality...I might not have made that decision."

*Find another conflict:* The normal procedure would be to refer the decision regarding use of the ASR to his own TAO. Again drawing on knowledge of *team member reliability*, however, the AAWC figured that his TAO "didn't make aggressive decisions...if it wasn't something that had happened before." *Resolve conflict by modifying the option:* Instead, he announced what he was going to do, and his TAO "went along with it." The AAWC adopted a *proactive* orientation with respect to his superior, influencing rather than soliciting his decision.

*Find another conflict:* The TAO, nonetheless, called the Battle Force staff to inform them of the decision, and they said to wait. The TAO told the AAWC that Battle Force

staff wanted to determine if any friendly troops were in the area of the Iraqi missile site. This created a new problem: The ASR had just radioed the AIC and AAWC that it was low on fuel and would have to strike the missile site immediately or else return to base. There was no time to wait for the Battle Force staff to close the loop. *Resolve conflict by finding another option:* The AAWC briefly considered waiting for the ASR's replacement, an S-3 aircraft, to become airborne. *Find conflict:* However this presented similar problems that, if anything, were worse than the problems with using the ASR: Taking control of the S-3 would require too much time. Moreover, the S-3 had more explicit restrictions on its use than the ASR, which would take even more time to work around. *Quick Test:* The AAWC did not think it worthwhile to further consider this option.

*Resolve conflict by modifying the option:* The AAWC now considered the possibility of acting prior to receiving clearance from the Battle Force. He would again be adopting a *proactive* orientation toward a superior, by denying the Battle Force Commander the option of preventing use of the ASR. *Find conflict:* But were there friendlies in the area? *Resolve conflict by retrieving information:* In deciding whether to use the ASR without clearance, the AAWC drew on knowledge of the *task situation*. He thought it extremely unlikely that any friendly forces would be in the area of the missile site, since he had been sending attack missions into that area all day. *Continue to resolve conflict by collecting information:* Because the cost of an error was high, the AAWC chose to verify this further by calling staff on the battleship Missouri, who confirmed that no friendlies were in the area.

*Continue to resolve conflict by adopting assumption:* It seemed reasonable to conclude that no friendlies were in the area, but why then was the Battle Force staff reluctant to approve use of the ASR? The AAWC drew again on knowledge of *team member reliability*. Based on past experience, the AAWC felt that the Battle Force staff was overly cautious in general. All the signs indicated that the Battle Force would eventually give its approval. He also concluded that if they did deny permission to send the ASR, that decision would be based on caution rather than on safety-related information. Acting prior to clearance was thus *predictive* with respect to his superior's eventual approval, but proactive with respect to his superior's real options. *Evaluate assumption:* The AAWC resolved the conflict by assuming that approval would eventually come, but accepting that he would have to "take the hit on being too aggressive" if permission were denied. He was comfortable with accepting this risk. By contrast, following the standard procedure required a predictive orientation to the enemy, based on assumptions he was far less comfortable with: that the enemy missile site would not fire, or that the carrier launch process would come off more accurately and quickly than before.

### Taking action

The AAWC told the TAO what he was going to do, then tasked the ASR to strike the missile site. The site was successfully destroyed. Clearance from the Battle Group Commander arrived shortly thereafter. The AAWC and TAO waited a few minutes, then reported the destruction of the missile site to the commander. They received commendation for their action, and use of the ASR in this way became a new standard

operating procedure in the battle force. The Battle Force commander never knew that the AAWC had acted on his own initiative before receiving clearance.

## DISCUSSION

In this example, taking initiative with respect to the enemy required taking initiative within the organization, and both required critical thinking. Critical thinking that focused on mental models of *action sequence*, *team member reliability*, and *purpose* enabled the AAWC to identify problems with the standard procedure. In particular, he saw that it implied a predictive rather than a proactive stance in the face of an unexpected enemy action (turning on its radar), and thus did not sufficiently reduce uncertainty about enemy action in the future (firing a missile). The desire to be proactive toward the enemy, in turn, was the source of the time pressure that influenced the AAWC's subsequent decision making. In that decision making, he drew on critical thinking about mental models to decide (i) whether to communicate, (ii) how to coordinate without communication, and (iii) how to evaluate communications that did occur. These are, of course, the issues identified in the Introduction as characteristic of time-stressed, novel, and spatially distributed situations. The AAWC's way of handling these issues involved each of the three time orientations:

(1) *Should we communicate?* Through critical thinking, the AAWC decided not to wait for closed-loop communication with the Battle Force commander. Waiting would have entailed an unacceptable loss of initiative with respect to the enemy. Instead, he chose to be *proactive* both with respect to the enemy and with respect to the Battle Force commander (and his own TAO). Consistent with Figure 4, the key mental models in this critical thinking process were friendly *purpose* (to prevent damage to the battle group by the missile site), and shaping both *enemy intent* and *friendly intent* (i.e., eliminating options).

(2) *What will the others do?* On the other hand, the AAWC also used critical thinking to achieve as much coordination as possible despite the lack of full communication, through a *predictive* time orientation. For example, he predicted that the standard procedure would not accomplish a strike on the missile with the required accuracy or speed. He also predicted with some confidence that friendly forces would not be in the area of the target. He predicted that the TAO would go along with the decision presented to him, and that the Battle Force commander would ultimately approve the strike on the missile site. Again consistent with Figure 4, the key mental models were *friendly intent*, *team member reliability* and the *rate of movement* (i.e., likely duration) of a friendly *action sequence*.

(3) *How good is the information?* Finally, the AAWC used critical thinking to evaluate the information that was communicated to him and to *react* appropriately to it. For example, he considered different possible intents of the enemy in turning on the missile site radar. He interpreted the hesitation of the TAO and the Battle Force staff as indicators of habitual caution rather than as signs of actual disapproval or risk. By contrast, he assigned greater credibility to the opinions of the AIC and the staff of the battleship Missouri, both of whom he regarded as more likely to favor decisive action in regard to the enemy. Again consistent with Figure 4, the key mental models were *alternative causes and effects* and *team member reliability*.

By means of critical thinking about mental models, the AAWC was able to develop proactive tactics both toward the enemy and toward his own organization. In doing so, he developed a mutually supporting framework of proactive, predictive, and reactive orientations toward different aspects of the task. He invested a small amount of time thinking in order to buy much more time for action. The long-term result was improved adaptation to environmental variability *at the organization level*.



### 3. HOW CAN CRITICAL THINKING BE TRAINED?

This section describes a strategy for training the battlefield thinking skills of Army tactical command staff officers, based on the Recognition / Metacognition model (Section 2). According to Salas & Cannon-Bowers (1977), a training strategy orchestrates (1) *tools* (such as feedback and simulation) within (2) *methods* (such as instruction, demonstration, and practice), in order to convey (3) a *content*.

In developing a training strategy, attention must be paid to the underlying theoretical conception of decision making. Different theoretical conceptions are associated with differences in content, methods, and tools – in short, along each of the dimensions that characterize a training strategy. In this section, we briefly examine the implications of different models of decision making for the content, tools, and methods of training. We then move on to a more detailed look at a training strategy based on the R / M model.

#### ROLE OF THEORY IN SELECTION OF A TRAINING STRATEGY

Table 4 outlines the most salient differences in content, tools, and method among training strategies based on (i) formal models of decision making, (ii) recognition-based models, and (iii) the Recognition / Metcognition model, respectively.

Table 4. Differences in training strategies typically associated with different views of decision making.

	Logical / Probabilistic Reasoning	Recognition	Recognition / Metacognition
<b>Content</b>	General purpose formal modeling and reasoning techniques.	Specific situation - response associations.	Mental model types and critical thinking strategies.
<b>Tools</b>	Normative model of decision processes.	Compilation of cues and responses used by proficient decision makers.	Cognitive model of proficient real-world knowledge structures & decision processes.
	A small number of paper & pencil examples.	Realistic simulation of a large number of representative scenarios.	Realistic simulation of a moderate number of challenging scenarios, mixed with more routine situations.
<b>Methods</b>	Explicit instruction.	Little instruction.	Explicit instruction.
	Practice with procedural feedback.	Practice with immediate feedback re correct response.	Practice with delayed or self-administered process feedback.

From the point of view of formal models of decision making, the *content* of training is a set of general-purpose techniques (Baron & Brown, 1991). The principle *tool* for defining this content is logic or decision theory, regarded as normative models of thinking (e.g., Watson & Buede, 1987). The primary *method* of presentation is explicit classroom instruction, ranging from focus on formal algorithms (e.g., Laskey & Campbell, 1991), to focus on more qualitative issues such as problem structuring (e.g., Mann, Harmonio, & Power, 1991). Examples of decision problems are not emphasized as content, but are used as *tools* for a variety of purposes: i.e., to motivate the formal techniques during instruction (Adams & Deehrer, 1991), to demonstrate their generality across domains (Mann et al., 1991), and for paper and pencil practice in the component procedures. Problems are selected to illustrate the algorithm or technique that is currently being taught. Often, the problems are artificially prestructured rather than presented naturalistically; i.e., the available options and the probabilities and utilities of their outcomes are explicitly stated. There is typically little emphasis on the ability to match the appropriate method to problems of different types (Beyth-Marom, et al., 1991) or on time-stressed conditions, in which the full analytical method may be infeasible.

At the opposite extreme, decision training based on the recognitional point of view attempts to convey examples of decision problems and their solutions as the *content* of training, not general-purpose techniques. Rapid and direct retrieval of the appropriate response to a wide range of situations is the training objective, not choice of the optimal response from a set of alternatives. The primary *method* in recognitional training is practice with a large set of representative problems. Little or no attention is given to explicit instruction, and trainees are usually not encouraged to verbalize the reasons for their decisions during practice. Immediate feedback regarding the correctness of the trainee's response ensures that the situation and the response to be associated with it are represented simultaneously in working memory (Reiser, Kimberg, Lovett, & Ranney, 1992). Two additional features of practice may be used to develop rapid, automatic responding: "Overlearning" – produced by exposure to a large number of trials with consistent stimulus-response mappings (Shiffrin & Schneider, 1977), and practice under time-constraints (Schneider, 1985). *Tools* like high-fidelity simulation may be used to increase the similarity of training conditions to real-world task environments (Means, Salas, Crandall, & Jacobs, 1993).

The R/M model yields an approach to training that is distinct from both formal and pattern recognition models. The *content* of critical thinking training is neither a small set of general-purpose methods nor a vast quantity of specialized patterns and responses. The focus is on a moderately sized set of mental model types (such as purpose, intent, team member reliability, and time orientation) and critical thinking strategies that critique and correct those mental models when direct recognitional retrieval is inadequate. Unlike specialized patterns, both the mental models and the thinking strategies are generalizable in many respects across domains that are characterized by (a) time constraints and (b) uncertainty about human action either within or outside the decision maker's own organization. Unlike general-purpose methods, they are most effectively taught by building on pre-existing familiarity with a particular domain (Kuhn, et al., 1988).

*Methods* for training for critical thinking include both explicit instruction and practice. Prior instruction on concepts and processing strategies has been found to facilitate learning during subsequent practice (Nickerson, Perkins, & Smith, 1985). In

particular, such instruction can provide trainees a new conceptual framework for understanding the skills being trained. For example, the notion that problems can and should be solved by a mechanical application of decision rules must be replaced by a more flexible, iterative, and constructive approach to selecting an action (Brown & Palincsar, 1989). Making principles explicit also helps students transfer what they have learned to varied settings (Collins, Brown, & Newman, 1989).

Practice in critical thinking involves realistic, but non-routine situations, even if they are relatively improbable (Lesgold, Lajoie, Bunzo, & Eggan, 1992). As a result, trainees are exposed to more challenging situations than they would be likely to experience in a representative sampling of the domain. During practice, the explicit articulation of problem-solving strategies is encouraged, to foster reflective self-awareness (Shoenfeld, 1987; Scardamalia & Bereiter, 1985). Problem conditions may be varied – e.g., more and less time-stressed, more and less routine, more or less high stakes – so that trainees learn to decide when to rely on direct recognition and when to use critical thinking strategies.

Feedback focuses on appropriate processes rather than on correct responses. Indeed, the notion that there is a single “correct” answer may often be counterproductive in the kinds of ill-structured or novel problems for which critical thinking is appropriate (King & Kitchener, 1994). Immediate feedback may also be counterproductive. First, it short circuits students’ efforts to understand the problem in depth. Delayed feedback, on the other hand, allows for discovery learning through free exploration of the problem (Bennett, 1992). Second, immediate feedback short circuits students’ efforts to evaluate their own performance. Instead, trainees can be asked to provide, or at least control, their own feedback, to foster self-reflective skills. For example, trainees may participate in a group discussion after practice, in which they critique the performance of others and respond to feedback regarding their own performance (Shoenfeld, 1987).

A important *tool* for providing feedback is expert modeling of the thinking processes to be trained (Collins, Brown, & Newman, 1989; Druckman & Bjork, 1991). This, too, may be turned into a constructive exercise by asking trainees themselves to compare their own performance with the performance of the expert model (Bloom & Broder, 1951).

### **A CRITICAL THINKING TRAINING STRATEGY**

Table 5 outlines the essential features of a critical thinking training strategy based on the above guidelines. It shows tools, methods, and content associated with the R / M model. We will discuss critical thinking training tools in the remainder of this section, before turning to a more detailed overview of the training content and an automated training tool in Section 4.

Table 5. Tools, methods, and content of the R / M critical thinking training strategy.

Tools	Methods	Content
<ul style="list-style-type: none"> <li>• Cognitive task analysis (e.g., critical incident interviews)</li> <li>• Theory-based definition of critical thinking skills</li> <li>• Survey of training needs</li> <li>• Interactive, graphical user interface</li> <li>• Challenging practice scenarios</li> <li>• Performance measures (process &amp; outcome)</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Information-based:</i> <ul style="list-style-type: none"> <li>• Frame decision making as flexible &amp; iterative</li> <li>• Prepare students to use specific concepts &amp; strategies during practice</li> <li>• Demonstrate decision processes</li> </ul> </li> <li>• <i>Practice-based:</i> <ul style="list-style-type: none"> <li>• Realistic, challenging</li> <li>• Mix with routine</li> <li>• Encourage verbalizing thought processes</li> <li>• Regard feedback as a skill to be trained</li> <li>• Guided practice with feedback and modeling of target behavior</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Focusing on purpose</li> <li>• Critical thinking about purpose</li> <li>• Orienting to the enemy in time</li> <li>• Critical thinking about time orientation</li> <li>• Using initiative</li> </ul>

### Tools

#### When is cognitive task analysis prescriptive?<sup>11</sup>

The prescriptive character of formal approaches to reasoning is usually taken for granted. Formal approaches start with a mathematical or logical model of how decisions ought to be made. Training can then focus on the systematic errors, or "biases," that are discovered by comparing human behavior in laboratory tasks to such formal models (e.g., Fischhoff, 1982). By contrast, a naturalistic approach to decision research takes as its starting point the way people actually make decisions in real-world environments, as revealed in interviews, observation, and contextually realistic experimentation (Klein, et al., 1993). It may not be obvious what leverage can be gained from the latter research. In particular, can it generate *prescriptions* about how to think better or make better decisions? Will it eventually arrive where "normative" approaches based on logic and decision theory begin, and lead to training that can mitigate the shortcomings of ordinary thinking?

<sup>11</sup> Some of the material in this section is adapted from Cohen & Freeman, 1997.

For a variety of reasons, it has been argued that the answer is *no*. First, there is the logical prohibition against deriving an *ought* from an *is*, a mistake which is called by philosophers, appropriately enough, the *naturalistic fallacy*. We cannot conclude that a particular decision process is the best one available simply because real decision makers use it. Second, naturalistic researchers allegedly view real-world decision making through rose-tinted glasses (Doherty, 1993). Indeed, some naturalistic decision researchers have criticized the idea, promoted by Kahneman, Slovic, and Tversky (1982) and others, that ordinary decision making is riddled by systematic errors or biases (e.g., Cohen, 1993). Third, there is an emphasis in naturalistic research on pattern recognition rather than on more explicit processes of reflective reasoning (Klein, 1993). It is not clear how a prescriptive framework could apply to rapid, relatively automatic processes. We can summarize these pessimistic points as follows: In naturalistic research, prescription is *impossible* because it would confuse what is and what ought to be, *unnecessary* because real-world decision making is already good enough, and *irrelevant* in any case because real-world decision making is intuitive rather than reflective.

We think each one of these claims is wrong or misleading. In this section and in Section 4, we describe a naturalistic training strategy for improving decision making skills which serves as a counterexample to all three of the objections itemized above:

With respect to point 3, the intuitive nature of decision making, the training strategy is premised on the importance of critical thinking skills that complement and go beyond pattern recognition. These skills monitor, verify, and improve the results of recognition in high-stakes and novel situations, when immediate action on a recognized response is not necessary. Critical thinking skills are inextricably tied to the recognitional processes they regulate, and do not represent an analytical *alternative* to recognition-based processing. However, such critical thinking strategies are subject to more deliberative control and explicit articulation.

With respect to point 1, the prohibition against deriving *ought* from *is*, the model that underlies the training is based on interviews with and observations of real-world decision makers. But it does not involve the naturalistic fallacy, because it does not indiscriminately infer what is desirable from what exists. Instead, the model of critical thinking skills is based on (a) comparisons between the decision processes of more and less experienced real-world decision makers, on the assumption that experience is correlated with proficiency; (b) comparisons between the decision processes of those explicitly judged to be more proficient and those judged to be less proficient by their peers, and (c) comparisons between decision processes used in tasks judged to be successfully accomplished and those used in tasks judged to be unsuccessful.

Cohen (1993), turning the tables, argues that the prescriptive character of formal models should not be taken for granted. Prescriptive claims are *arguments*. As such, they must be evaluated in part based on (1) formal properties that seem desirable. But they must also be evaluated with respect to considerations such as (2) the face validity and plausibility of the decision strategies to which they lead (Shafer & Tversky, 1988) and (3) correspondence with successful practice (L. J. Cohen, 1991; Goodman, 1965). A convincing prescriptive model must be sufficiently *close* to actual reasoning so that *deviations* from the model are interesting, hence, useful for training and decision aiding. In this vein, a more illuminating and useful tool for understanding and evaluating human

reasoning may be provided by models of assumption-based reasoning (Harmon, 1986; Chapman, 1993; Cohen, 1993; Koslowski, 1996).

Finally, with respect to point 2, the naturalistic approach does not imply that real-world decision makers never make errors. Errors can be identified by examining discrepancies between more and less experienced, or more and less proficient, decision makers as identified by peers, or aspects of decision processes that are correlated with performance in real-world tasks that is judged to be less successful. Rather than denying the existence of errors, the naturalistic approach provides a more useful way of looking at errors. For example, they are not defined as deviations from the purely formal constraints of decision theory or logic. Such definitions prove unexpectedly slippery in any case, since deviations from one formal model may be consistent with a formal model that makes different assumptions – for example, about the goals or beliefs of the decision maker (Smithson, 1989; Cohen, 1993). More fruitful theoretical insights into the nature of reasoning errors may, once again, be provided by models of assumption-based reasoning combined with constraints on information processing resources (i.e., the inability to recall or attend to all the factors underlying a belief or decision).

For these reasons, cognitive task analysis serves as an essential tool in the development of a genuinely *prescriptive* critical thinking training strategy. The training content is based on critical incident interviews with active-duty Army officers, in which they described their actual experiences in combat and exercises. We analyzed these interviews to discover the officers' thinking strategies, ways of organizing information, and decisions (see Section 2 above). The training is based directly on differences in the way that more and less experienced officers handled similar types of situations, and indirectly on cognitive theory (summarized in the R / M model), derived jointly from that data and from the cognitive research literature.

### **Theory-based definition of critical thinking skills**

Based on the findings of the cognitive task analysis and theoretical model described in Section 2, the following skills appear to characterize proficient decision makers in the Army tactical decision making domain. Proficient decision makers:

- 1 Develop and use appropriate *mental models*
  - 1.1 *Purpose*: Develop and use models of higher-order or longer-term purposes. Frame decisions in a larger context.
  - 1.2 *Time orientation*: Develop models of the relationship of own actions to enemy decision making cycle, and use these models to develop proactive, predictive, and reactive plans. Seize initiative with respect to other decision makers.
- 2 Adopt appropriate *critical thinking strategies* with respect to these mental models
  - 2.1 Identify and seek to fill critical information *gaps* in models. For example, make expectations explicit and monitor events for consistency with expectations.
  - 2.2 Identify and seek to resolve *conflicts* between situation understanding and observations, or between plans and goals. For example, mentally simulate plans to see if they achieve all goals; generate contingency plans, or branches, to compensate for risk

2.3 Identify and evaluate *assumptions* underlying situation models or plans. For example, construct a story that you must believe in order to accept a situation model or plan, and evaluate the story; if the story is implausible, try to develop an alternative mental model, and evaluate that.

2. 4 Determine when and if to commit to action based on available time, stakes, and uncertainty. *Regulate* critical thinking process by balancing costs and benefits.

### **Analysis of current training shortfalls**

As noted, the content of training was primarily based on a comparison of the knowledge representations and decision processes of more and less experienced officers in tactical decision making situations. It was important to verify that the differences we identified were in fact perceived as important in the Army community. Therefore, prior to final development of training materials, we supplemented our analysis by two additional types of data:

- An independent evaluation of the quality of decision making in a subset of the critical incident interviews was performed by LTG Leonard Wishart (U.S. Army, ret). Analysis of the basis of LTG Wishart's evaluations clarifies the good and bad aspects of officers' decision processes
- We discussed perceived problems with current training methods with a number of instructors at the Army Command and General Staff College, Leavenworth, KA.

### **Independent evaluation of decision making skill**

Table 6 provides examples of LTG Wishart's comments on two officers: MAJ A, whom he did not evaluate highly, and LTC B, whom he did evaluate highly. Based on such comments, in conjunction with other information in the protocols themselves, we identified relevant cognitive skills or deficiencies, as shown in the second column of the table.

As indicated by Table 6, General Wishart's evaluations confirmed the identification of critical thinking skills based on the R / M model.

Table 6. Illustrative comments from independent evaluation of critical incident interview, and inferred critical thinking skills.

	LTG Wishart's comments	Inferred thinking skill or deficiency
<b>MAJ A</b>	MAJ A did not have as clear an idea of the mission or its constraints as did LTC B	absence of understanding of higher-level purpose
	MAJ A did not actively go after information he thought the CG needed or he might need.	lack of critiquing to identify gaps or conflicts in knowledge  failure to use predictive time orientation with respect to commander
	He took what was provided, asked some questions, analyzed it, and then provided the CG with his assessment.	limited critiquing of given information  use of reactive time orientation with respect to information
<b>LTC B</b>	LTC B searched out new sources, new information...	critiquing to identify and fill gaps in information & to test predictions for conflict with events  proactive time orientation with respect to information sources
	and appears to have looked for contradictions. He tried to anticipate changes...	critiquing to find and resolve conflict  use of mental models of source reliability
	Conflicting information does not seem to disturb him; it is just one more piece to be examined and judged before reaching a decision	critiquing to identify assumptions underlying conflicting evidence
<b>General comment</b>	All tended to focus their attention early in the preparatory phase on those elements of METT-T which were generally fixed or about which more was known. Those things which could vary widely were ignored or given little attention.	Critiquing to identify gaps in model Critiquing to distinguish reliable from unreliable assumptions (with consequences for stability of situation)  Decision not to allocate cognitive resources to problems for which stakes are not yet high and for which solutions would be unreliable



### Discussions with CGSC instructors

In conversations with us, several instructors at the Command and General Staff College (CGSC) expressed a strong need for instructional materials on decision making that go beyond Army doctrinal publications and the standard Military Decision Making Process (MDMP).

For example, an instructor in the Center for Army Tactics at CGSC is attempting to teach a more flexible thought process than the procedure-oriented MDMP. But he has been frustrated in his efforts to find appropriate teaching material in Army doctrinal publications or elsewhere. He feels that he is working against student habits acquired in other Army training. To date, he has relied largely on: (i) Readings in military theory and military history; (ii) Tactical Decision Games developed by the U.S. Marine Corps, with limited feedback in class; and (iii) larger scale simulator exercises (Janus). This instructor expressed enthusiasm for training that will combine clear *instruction* in flexible thought processes, *practice* in realistic scenarios, and detailed *feedback*.

Specific topics currently being emphasized by this instructor confirm the relevance of the thinking skills identified in our own analysis. Table 7 lists some of the topics addressed by this instructor and corresponding skills in the R / M framework:

Table 7. Correspondence between topics in Center for Army Tactics course and critical thinking skills in the R / M framework

Course topic	Critical thinking skill
Nested concepts, i.e., hierarchy of the tasks and purposes assigned to different friendly units	Mental models of higher-order purpose
Decentralized battle and the need for initiative, including in some cases deviation from mission	Critical thinking about higher-order purpose to identify potentially conflicting events or goals, and to modify plan if necessary
Aim to defeat the enemy's will	Proactive time orientation, i.e., mental models of enemy intent and of how friendly action can influence enemy decision making

Another CGSC instructor, at the Center for Army Leadership, has made a more explicit effort to train students in critical thinking. However, he has been forced to rely on general-purpose texts on logic, probability, etc. The abstract nature of the materials makes transfer to the battlefield difficult. These considerations provide support for a naturalistic approach to training that links concepts and principles closely to real-world applications in the relevant domain.

### Practice scenarios

Practice exercises are a crucial part of the critical thinking training. All exercises involve relatively realistic (though brief) military scenarios. A manual classroom version of the critical thinking training has utilized a scenario (centering on an imaginary island

called Arisle) developed by Dr. Rex Michel at the Army Research Institute, Fort Leavenworth Field Unit. This scenario was also included in one version of the automated training system. The Arisle scenario is described in greater detail in Section 5, on the evaluation of the training.

A later version of the automated training, developed for use at the Command and General Staff College, utilizes a variety of scenarios adapted from the Tactical Decision Games feature published monthly in the *Marine Corps Gazette* (see also Schmitt, 1994). Each of the scenarios selected for use in the exercises addresses the issue of initiative in a context of uncertainty, time stress, and limited communication. Two of the *Marine Corps Gazette* scenarios are being used as pretest and posttest for evaluation of the automated training system at CGSC. These will be described in detail in a subsequent report.

#### **Interactive, graphical user interface**

We have developed a computer-based interactive training program for Army battlefield critical thinking, packaged as a stand-alone CD that runs under Microsoft Windows, and that can also be accessed by a browser on the World Wide Web. The program, which is called MEntalMOdeler, or MEMO, uses graphical interactive techniques to present concepts and provide practice and feedback. MEMO has recently been assigned and evaluated in an advanced tactics course at the Army Command and General Staff College (Center of Army Tactics), Leavenworth, KA. We describe this system in more detail in Section 4.

#### **Hypotheses and performance measures**

A final tool is represented by a set of performance measures used to evaluate the success of the training. These measures address both critical thinking skills –through process measures – and outcomes – through the agreement of trainees' decisions with those of a subject matter expert (SME).

As noted above, the skills to be targeted by R / M training were identified based on convergence of R / M theory, analysis of interview and problem solving protocols from Army officers, and identification of student needs through discussions at CGSC. Measures of these skills were developed to test the hypotheses listed in Table 8.

**Table 8. Associated critical thinking skills, hypotheses, and performance measures.**

<b>Critical thinking skills</b>	<b>Hypotheses</b>	<b>Measures</b>
<b>Consider high level purpose</b>	Training will increase the likelihood that officers refer to the purpose of superior echelons	Mention of purpose of units higher than one's own; whether higher-level purpose actually influences development of plan
<b>Use time orientation effectively</b>	Training will increase the likelihood that officers will utilize proactive and predictive planning	Frequency of occurrence of proactive, predictive, and predictive-reactive (i.e., contingent) plans
<b>Detect and fill gaps</b>	Training will increase the breadth of factors that officers consider.	Number of different types of factors that officers mention (e.g., enemy doctrine, enemy bridging equipment, slope of terrain, etc.); SME's assessment of relevance of factors
<b>Detect and resolve conflict</b>	Training will increase the amount of conflicting information that officers (i) detect and (ii) attempt to resolve	Number of items of conflicting information referred to; whether a conflict is dealt with (e.g., by collecting information, explaining it, or developing a contingency plan); SME's assessment of appropriateness of resolution
<b>Detect and evaluate assumptions</b>	Training will increase the number of assumptions that officers (i) detect and (ii) evaluate.	Number of assumptions explicitly mentioned; whether an assumption is assessed for plausibility; SME's assessment of quality of trainee's judgment
<b>Judge when to commit to action</b>	Training will increase officers' confidence in their plans	Numerical assessments of confidence in preferred plan and any alternative plans that were considered
<b>Improved outcomes</b>	Training improves decisions and outcomes.	Agreement between trainee's plan and plan of SME; SME's assessment of quality of trainee's plan; increase in agreement among plans due to training

## 4. CRITICAL THINKING TRAINING

### SUMMARY

The training teaches students how to think critically about *purpose*, *time*, and *uncertainty* – and shows them how these elements combine to create *initiative*. It includes four major segments. The first segment contains an introduction to the mental models that represent purpose, followed by a second segment on thinking critically about those mental models. The third segment addresses the mental models that represent time orientation (i.e., influencing, predicting, or reacting to another agent), followed by a fourth segment on how to think critically about those mental models. The training increases in difficulty as it progresses through these four segments. A final, fifth segment deals with more advanced applications of the concepts. It applies the mental model and critical thinking concepts to issues related to initiative, in *maneuver warfare* and *attrition* tactics.

As discussed in Section 4, the training design utilizes both information-based and practice-based training methods. Each segment of the training contains an introduction to the relevant concepts using both verbal and graphical methods, followed by examples and historical case studies of how the concepts apply, and by interactive exercises with feedback.

#### Segment 1: Purpose

Focus on purpose increases with experience and is closely associated with the ability to adopt a proactive time orientation (see Figure 4). This section of the training, which is the simplest, gives students conceptual and graphical tools for organizing their thinking about purpose. The main points of the section are (i) that thinking about the situation and about one's own plans should always be guided by an understanding of purpose, and (ii) purpose is not simply the immediate mission of your part of the organization, but includes the purposes of adjacent and superior units. Purpose in this higher-level, longer range sense provides the big picture within which critical thinking takes place.

## Exercise: Nesting Diagram Arrows

<p><b>Answer questions 1 and 2 here:</b></p> <p>1.</p>     <p>2.</p>	<div style="text-align: right; font-weight: bold; margin-bottom: 10px;">Nested purposes</div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><b>1. What does this horizontal arrow indicate about the purpose of your higher unit?</b></p> </div> <div style="width: 45%;"> <p><b>2. What does this vertical arrow indicate about the adjacent unit's purpose?</b></p> </div> </div>
---	---

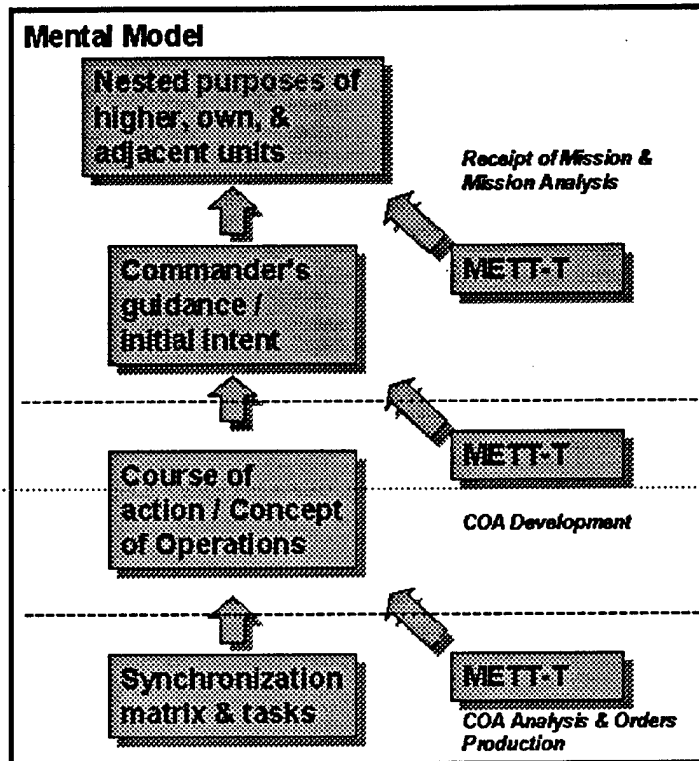
39

Figure 10. Verification of comprehension of material on nesting diagrams.

The section starts by reviewing a graphical tool, called a *nesting diagram*, that shows *why* your own unit has the purposes and tasks that are assigned to it, in terms of its relationships to purposes and tasks of adjacent units and superior units two or more levels up. A nesting diagram shows which units are assigned the main effort of their superior unit and which adjacent units are tasked to support those efforts. The exercise shown in Figure 10 is part of a simple test of comprehension for this section. The training provides practical guidance on how to extract elements of the nesting diagram from an operations order received from superior headquarters, and contains exercises on constructing such diagrams in both simple and complex cases (e.g., missing information, purposes not lined up with the organizational hierarchy). Many students are already somewhat familiar with nesting diagrams, and they thus provide a good entry point for understanding mental models.

## Summary: Mental Models and MDMP

From top to bottom,  
at every stage,  
everything in the  
mental model is  
linked to purpose.



72

Figure 11. Overview of how mental models are elaborated through Military Decision Making Process.

The next section generalizes the idea of a *mental model* beyond nesting diagrams. A mental model is defined as a succinct summary of events or ideas, which shows how each event or idea is linked to success or failure of a purpose. Mental models, which can be verbal or graphical, provide a tool to help decision makers stay focused on the purpose as through all stages of the military decision making process (MDMP). Figure 11 shows the sequence of mental models that are generated through the MDMP. Upon receipt of the mission, the command staff creates a nesting diagram placing their own unit in the larger context of the operation. Planning starts with this nesting diagram and asks *how* the various purposes it represents can best be achieved. The initial answer to this question is the commander's guidance or intent, which states how the purposes of the unit will be achieved in the present situation. Subsequently, during course of action development, the mental model is elaborated in still more detail, to provide a concept of operations. Later, during course of action analysis, the mental model takes the form of a detailed synchronization matrix, coordinating activities of different subordinate units at different places and times. This section of the training emphasizes diagrammatically how all these stages of mental model development are linked to one another and to the unit's purposes.

The next section begins the discussion (which continues through the rest of the training) of how mental models are used to make decisions. It emphasizes the importance

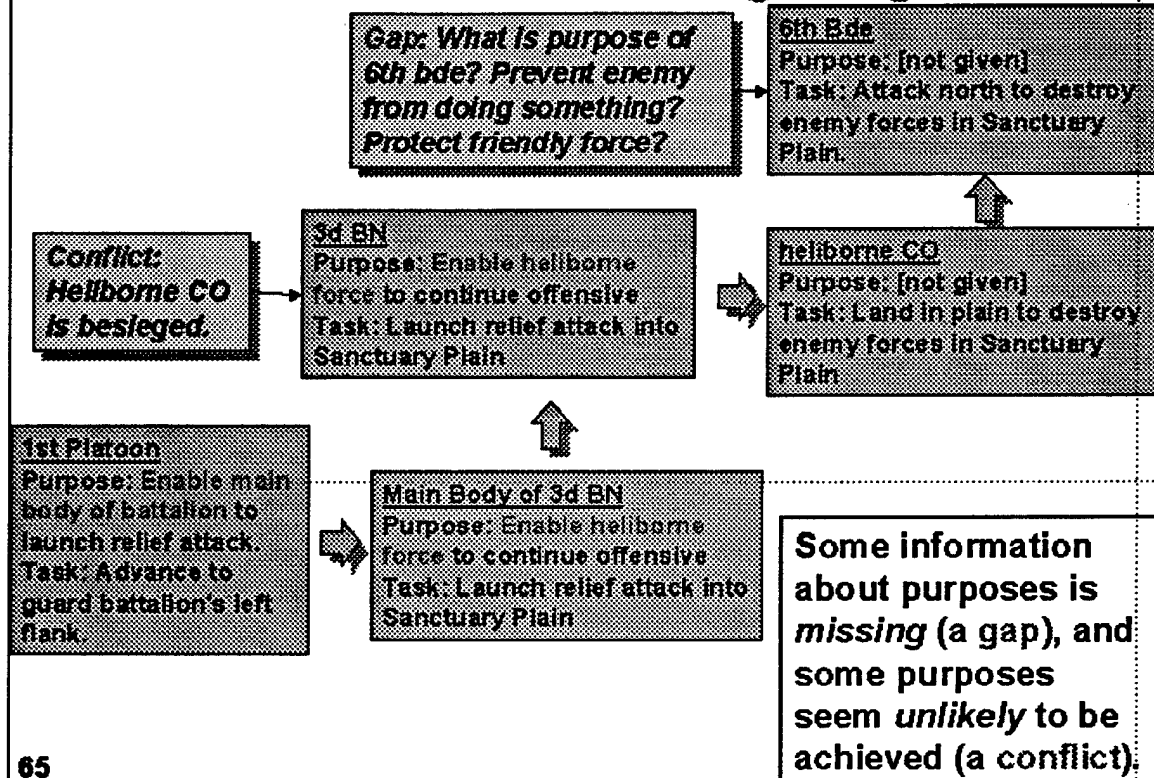
of considering higher-level purposes and how this can influence planning. A plan that is designed to achieve a unit's immediate purpose may be inadequate if it does not also put the unit in a position to provide back-up for adjacent and superior units, and to assume their tasks in the case of the unexpected.

### **Segment 2: Critical thinking about purpose**

This section provides an overview, examples, and exercises of the critical thinking process, called *I.D.E.A.S.* (an acronym for *Identify, Deconflict, Evaluate, Act, and Stop*), based on the model in Figure 7. The first three steps (*Identify, Deconflict, and Evaluate*) correspond to critiquing for the three kinds of uncertainty identified in our research: gaps, conflict, and unreliable assumptions. More specifically, the first step is to identify and fill gaps in mental models, i.e., missing components of the plan or of one's situation understanding that are likely to have an impact on the achievement of purposes. The second step is to identify and resolve conflicts between information sources or goals. The third step is to find and evaluate assumptions in the current plan or situation model. *Act* represents the different correcting strategies that can be adopted to address those problems and to improve the situation model or plan. *Stop* stands for the Quick Test, which weighs the benefits of continued critical thinking against its costs and determines when it is necessary to take action based on the best current solution.

These steps are discussed by means of examples from both planning and real-time operations (e.g., Figure 12). Filling gaps in a plan leads to discovery of a conflict between optimal achievement of the immediate purpose of the unit and providing back-up for higher-level purposes. A variety of correcting steps are illustrated and evaluated: e.g., collecting more information to confirm or disconfirm the likelihood that other units will need back-up, adding a branch or contingency to the existing plan in case of unexpected events, changing the current plan to provide more flexibility, or accepting the risk that nothing will go wrong for other units. During the operational phase of the plan decision makers not only monitor progress in achieving their own goals, but also monitor the success or failure of other units in achieving their goals. When unexpected events during an operation occur, an immediate decision must be made on how and what to communicate, and whether to continue on the original task or to shift the focus of effort (Figure 13).

## Problems in the Nesting Diagram



65

Figure 12. Part of an interactive exercise on identifying and handling problems with a mental model.

An interactive exercise requires students to critique and modify a plan in the face of surprising events. Feedback is given, and then a new variant of the plan is provided that addresses shortcomings of the previous option. The students must then critique and modify the new option (Figure 13). Feedback is again given, along with yet another variant of the plan to be critiqued and corrected. A historical example of initiative is also provided, involving U.S. Grant at Vicksburg. Attention to higher-level purposes led General Grant to abandon his line of communications, modify virtually every part of his orders, and still achieve one of the pivotal victories of the Civil War (Figure 14).



**Option 2**

**Action:** Attack the enemy near Narrow Bridge.

**End state:** We help MB of bn win firefight and get through Narrow Pass.

**Conflict:** We will be running head on into Bn's flanking move!

**Conflict:** We will be in the line of enemy machine guns!

**Conflict:** Left flank of Bn at Western Narrow Pass will not be protected!

**Conflict:** We will not be able to help in case crossing Narrow Pass is not possible. We will be sacrificing freedom of movement by committing against enemy strength!

**Assumption 1:** Main body of bn can win this fight without our help.

**Left Flank:**  
Purpose: Establish narrative of withdrawal to launch rear attack.  
Task: Advance to guard against left flank.

**Main Body of MB:**  
Purpose: Deal with enemy.  
Task: Launch into battle.

**Line to continue offensive:**  
Task: Launch into battle.  
Info: Secondary Plan.

**Assume on:**  
Action: Get going.  
Task: Launch plan to destroy enemy forces in Secondary Plan.

**On the:**  
Purpose: Get going.  
Task: Attack with all destroy enemy forces in Secondary Plan.

**Conflict:** They are being

**Conflict:** They are being

**Option 2 action is intended to handle the unreliability of assumption 1, but it gives rise to new potential conflicts.**

37

46

A final topic on critical thinking about purpose involves introduction of a devil's advocate strategy. This strategy involves imagining that a crucial assessment or plan will fail to achieve its purpose(s), and forcing oneself to explain how that could happen. Students learn to kickstart their imagination by picturing an infallible crystal ball that persistently tells them their explanations of the failure are wrong, and demands that they generate another one (Figure 15). They also learn to use their mental models to identify points where failure could occur. An interactive exercise asks that they use this technique to find and resolve problems in a tactical scenario.

## Grant's Critical Thinking Strategies

In sum, Grant's plan for the Vicksburg campaign was the fruit of three highly effective *critical thinking strategies*:

(1) **IDENTIFY**: Even when they are not specified, identify & try to achieve the most fundamental purposes.



(2) **DECONFLICT**: When your plans seem to conflict with fundamental purposes, *take nothing for granted*. Scrutinize any supposed constraints. *Constraints are simply assumptions*, and you may find a way around them!

(3) **EVALUATE**: An added benefit of finding a way around the assumptions is that you are likely to surprise the enemy.

181

Figure 14. Summary of historical example on critical thinking about purpose.

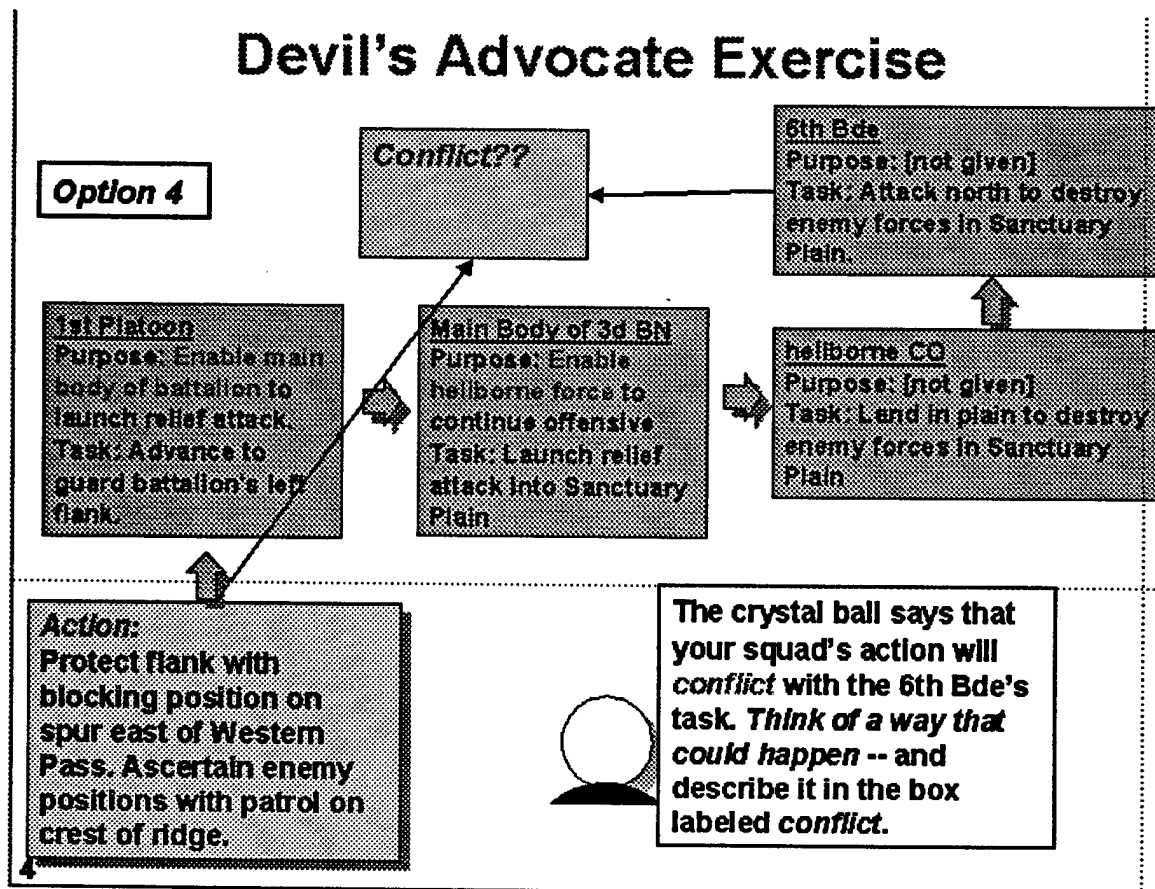


Figure 15. Part of interactive exercise on use of devil's advocate technique.

### Segment 3: Time orientation

The next major segment of the training involves *time orientation*, i.e., putting purposes to work in a framework of time and action. In the first section, the training extends the graphical mental modeling tools introduced in the previous segment, by adding a horizontal time dimension to represent a sequence of events and actions (the vertical dimension continues to represent the hierarchy of purposes). *Initiative* is discussed in terms of mental models that show how friendly actions can influence, predict, or react to the decision cycle of the enemy or other friendly units. The three time orientations – proactive, predictive, and reactive – are explained in terms of how and when they reduce uncertainty about another agent's actions.

The next section of this segment introduces the use of time orientation models to make decisions. It describes the questions that need to be asked to fill gaps in reactive, predictive, and proactive mental models (e.g., Figure 16). To create a predictive model, for example, the decision maker asks: "What will the enemy do and what strengths or weaknesses are associated with those actions? What are the implications of those strengths and weaknesses for my purposes? And what can I do to avoid the strengths or exploit the weaknesses?" To create a proactive mental model, on the other hand, the decision maker asks: "What are my higher purposes? What do I *want* the enemy to do

that will promote those purposes? And what can I do to get him to do it?" An interactive exercise requires students to identify the time orientations implicit in different strategic, operational, and tactical plans during Operation Desert Storm (Figure 17).

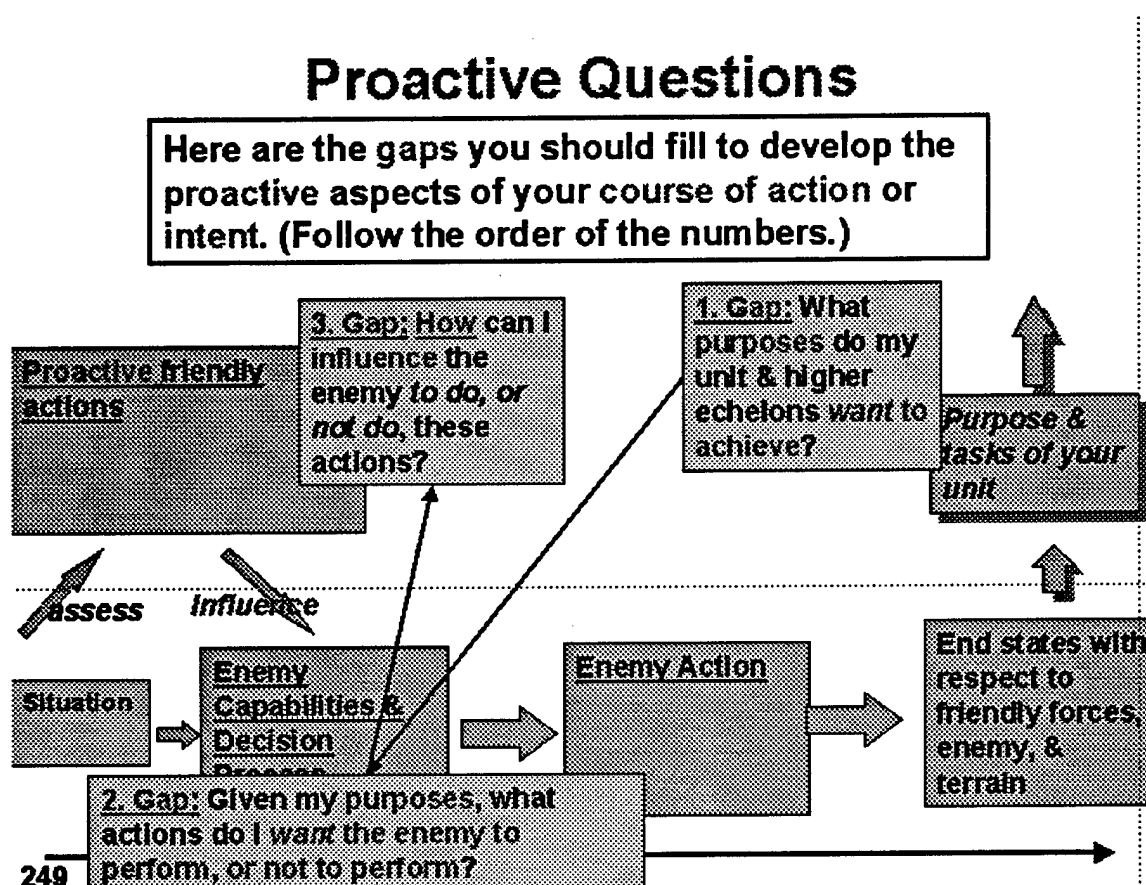


Figure 16. Questions to answer for a proactive time orientation.

### Segment 4: Critical thinking about time orientation

This segment introduces students to a more sophisticated set of critical thinking strategies, and to a deeper understanding of how proactive, predictive, and reactive orientations can co-exist in a single mental model. The first section discusses how correcting one kind of problem can lead to other problems across cycles of critiquing and correcting (Figures 8 & 9). The primary emphasis is on how each time orientation can be used to address weaknesses in the other time orientations, as plans are gradually elaborated and improved, and that the most effective plans ultimately involve several time orientations in a mutually supporting pattern.

## A Solution

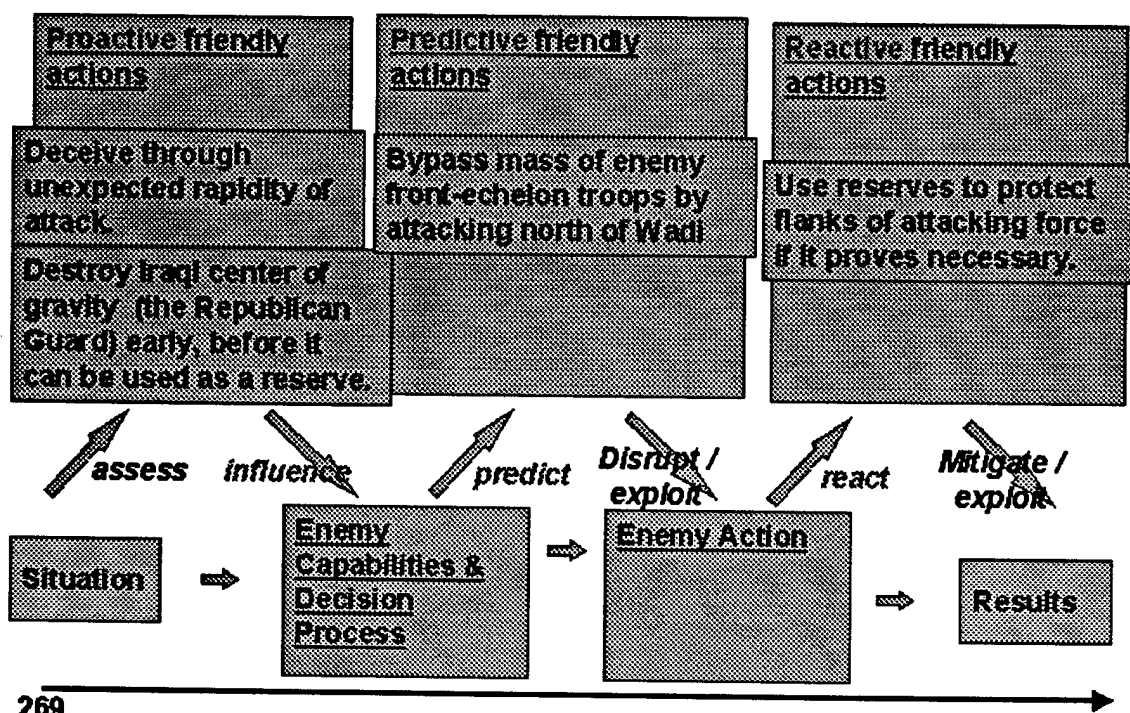


Figure 17. An exercise on identifying time orientations in plans.

The next section provides a detailed example of the evolution of a plan through the I.D.E.A.S. cycle, and illustrates a simple multiple time-orientation pattern. Planning begins with a predictive model, in particular, a plan based on the expectation that an enemy unit will cross a river and be vulnerable to attack as it crosses. A devil's advocate strategy is then used to critique the plan. (An infallible crystal ball says, "The plan will fail. Explain how.") This process brings to light hidden assumptions about enemy intent upon which the plan depends. To make the plan more robust, proactive tactics are developed to lure the enemy across the river. Other proactive tactics are developed to increase the enemy's vulnerability while crossing by using artillery to prevent it from concentrating forces. Figure 18 depicts the critical thinking processes that lead to these proactive tactics. To guard against the possibility that predictive and proactive tactics fail to achieve their purpose, the plan is further elaborated to include monitoring of enemy movements and a flexible, reactive orientation in case the enemy does something other than what is expected. The result is a template in which different time orientations provide mutual support: Proactive tactics are utilized to increase the chance that predictive assumptions will turn out to be true, while reactive tactics monitor for the unexpected.

In a continuation of this example, the enemy does in fact behave in a surprising manner (heading in a different direction than expected). A new template for mutually supporting time orientations is illustrated. The initial reaction is designed to mitigate any immediate threat from the enemy action. The next phase is to consider any enemy weaknesses that the action exposes or creates (e.g., failing to cross the river leaves a command post relatively undefended on the other side). These weaknesses are, ideally, independent of specific assumptions about what the enemy is up to. Predictive tactics are developed to exploit opportunities that are identified. At the same time, a way is sought to use these opportunities to *create* new weaknesses, i.e., to proactively degrade the enemy's capability to pursue *future* operations (e.g., by destroying a command post, or attacking logistics). The result of this critical thinking process is a template for reaction to surprise that shifts as rapidly as possible from reactive to predictive to proactive orientations.

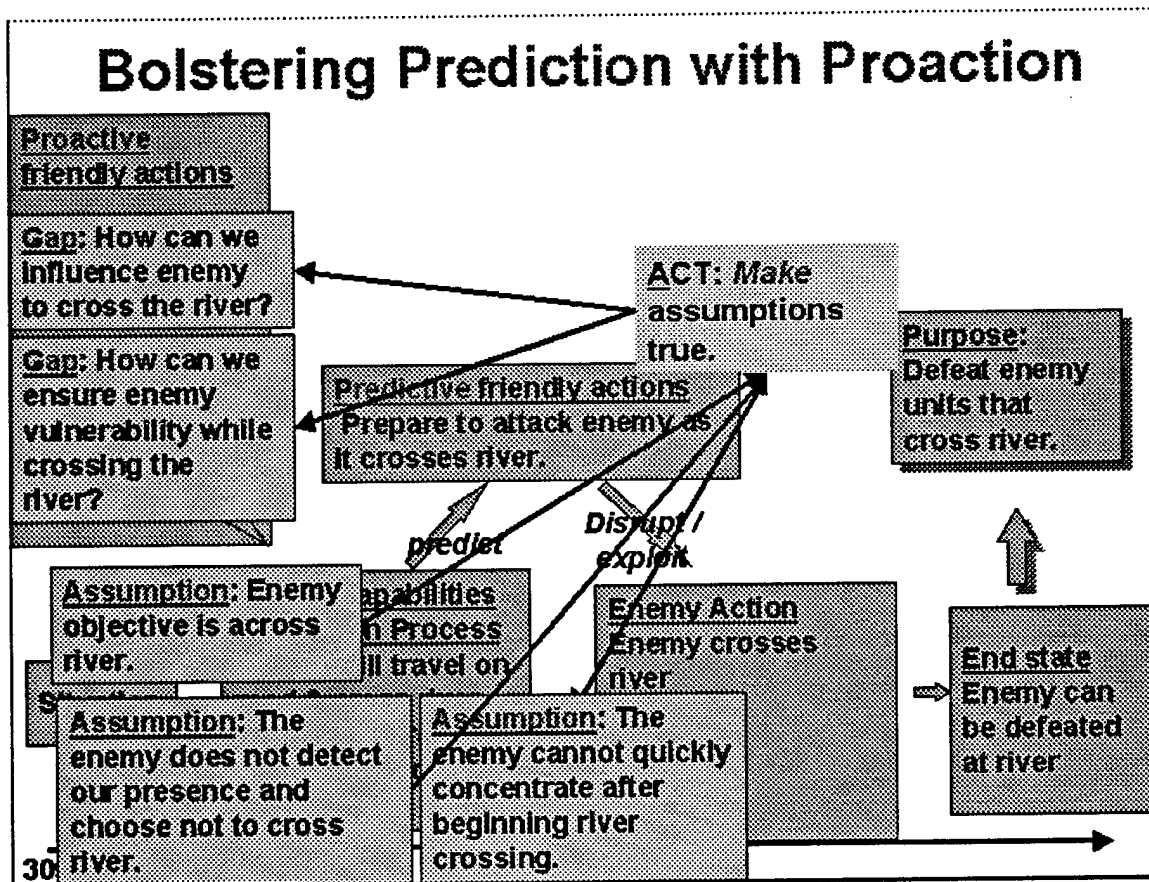


Figure 18. Assumptions required by predictive orientation may be addressed by becoming more proactive.

Two historical examples of reaction to surprise are described, in both of which unexpected enemy action was turned to friendly advantage: U.S. Grant at Fort Donelson (Figure 19), and Eisenhower in the Ardennes offensive (Figure 20). An interactive exercise requires students to identify the combinations of time orientations represented by the small unit tactics described in James McDonough's book, *Platoon Leader*.

## Proactive Consequences

The fall of Fort Donelson broke the Confederate Western front, won Kentucky for the Union, and forced the evacuation of other positions in Tennessee and Kentucky. This transition from reactive to predictive to proactive is a pattern we often find in successful response to surprise.

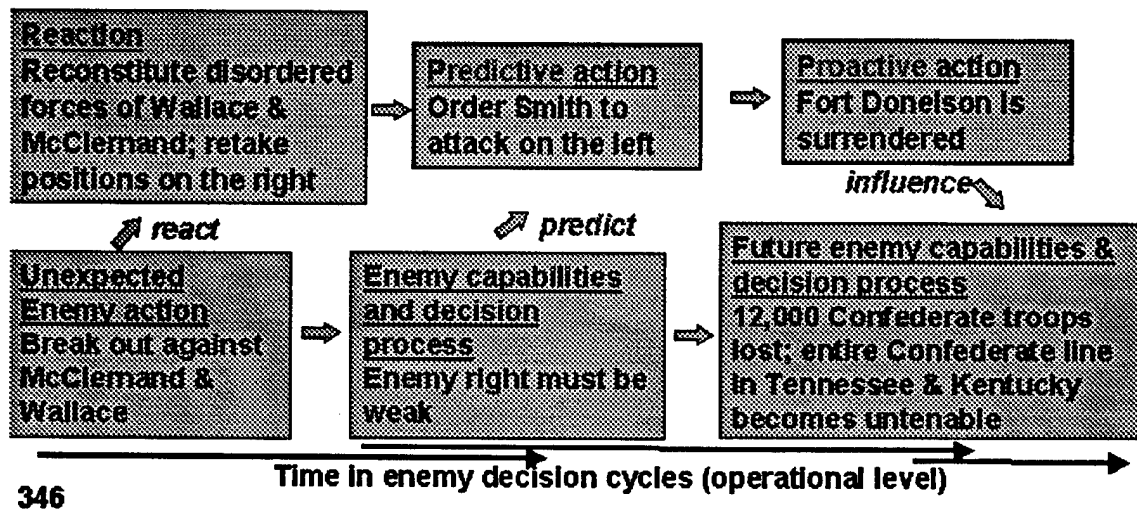


Figure 19. A time orientation template illustrated by Grant's decision making at Fort Donelson.

# Predictive and Proactive Operations

Eisenhower's offensive strategy had other proactive elements -  
 - keep the enemy off balance by rapid advances, and fatally strike their key industrial areas. However, this strategy presupposed a predictive acceptance of risk in the Ardennes.

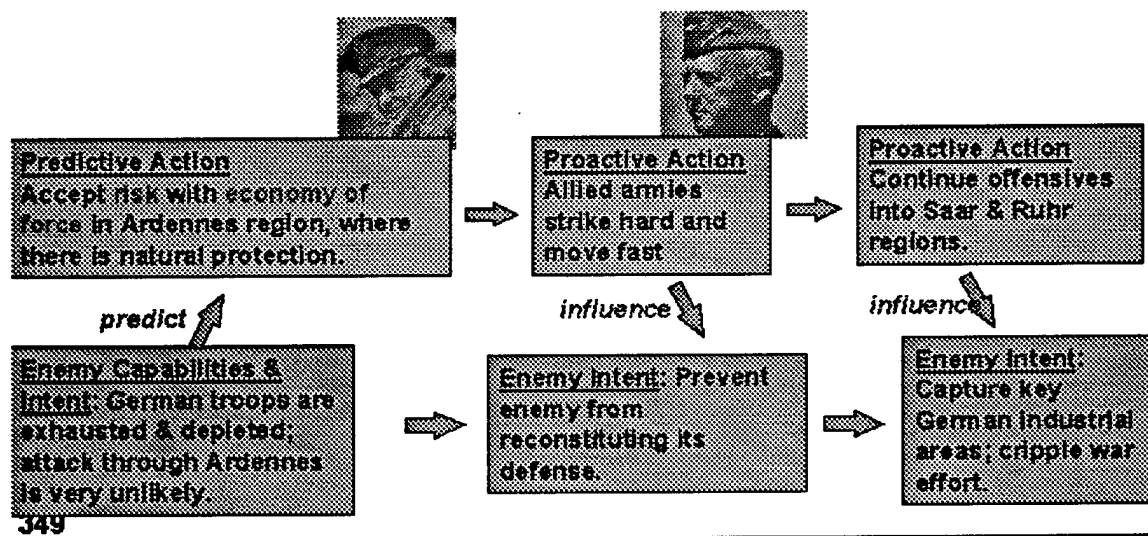


Figure 20. Another time orientation template illustrated by Eisenhower's decision making regarding the Ardennes.

## Segment 5: Applications to initiative-oriented fighting

This segment continues to focus on critical thinking about time orientation, but gives special attention to issues concerning initiative raised by proponents of *maneuver warfare* and to the contrast between maneuver and attrition tactics (Hooker, 1993; Lind, 1985; The United States Marine Corps, 1989; Leonhard, 1991, 1994). The first section clarifies the difference between maneuver and attrition methods by the use of diagrammatic mental models depicting all three time orientations: (1) *Reactive*: Attrition emphasizes taking time to prepare, while maneuver emphasizes the ability to react quickly and flexibly to events by local commanders on the spot. (2) *Predictive*: Attrition emphasizes predicting and attacking enemy strength, while maneuver emphasizes predicting and attacking enemy weakness. (3) *Proactive*: Attrition destroys the enemy's assets in order to gradually wear down its ability to fight and limit its future options, while maneuver tries to generate moral effects, like shock and panic, which reduce the ability of enemy to make decisions at all and can lead to a sudden enemy collapse.

The next section shows how maneuver tactics draw on a highly interdependent system of mutual supports among time orientations. A series of graphical time orientation templates is presented to depict these relationships. For example, the tactics of "surfaces and gaps" involves mutual support between rapid reaction and prediction of enemy weakness. Friendly forces probe in many locations for weaknesses (or "gaps") in enemy



front lines, and take initiative in order to react rapidly to any success, by sending reserves through the gaps into the enemy rear. If this *reaction* is rapid enough, the enemy will be *predicted* to be unable to repair the breach in time to prevent the exploitation. At the same time, attacking predicted enemy weakness makes speed possible by avoiding unnecessary fights. Thus, reactive and predictive orientations support one another.

Predictive and proactive orientations are even more closely intertwined in maneuver warfare (Figure 21). The objective of the exploitation of gaps is *proactive*: to reach the enemy rear and strike a high-leverage enemy vulnerability, typically command and control or logistics, without which the enemy cannot continue to fight. This objective is *predicted* to be relatively lightly defended by virtue of being in the rear, and the rapidity of the attack is also expected to prevent any redeployment of enemy forces for its defense. In addition, the predictive aspects of this action can provide an important *proactive* byproduct: By attacking suddenly in an area thought to be safe, friendly forces can cause the enemy to panic. This panic will proactively degrade the enemy's ability to continue the fight as much as the actual loss of command and control or logistics. These proactive effects in combination create new weaknesses that can be further exploited by predictive actions.

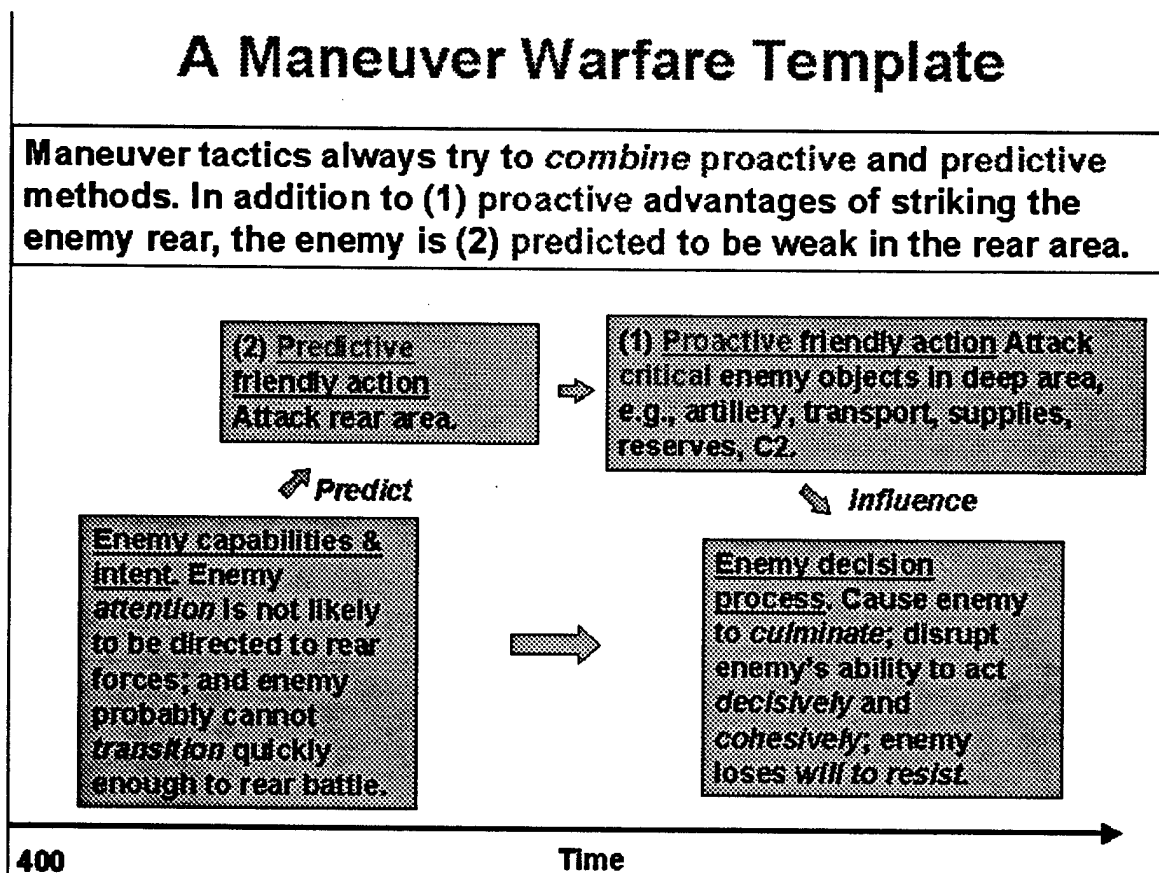


Figure 21. A way in which predictive and proactive time orientations support one another in maneuver warfare.

In short, the essence of maneuver warfare is the snowballing, positive feedback effects that it strives to create among the three time orientations. Autonomous decision making by low-level units is crucial for the required rapidity of response that gets the process going. The purpose is to win as quickly as possible, at the least cost. An interactive exercise requires students to apply maneuver warfare concepts in the process of critical thinking about courses of action (Figure 22).

## Rescue the Patrol

8. Would you send troops to help the patrol at Point R? Explain why or why not? Think about how this might conflict with achieving your purpose. Fill in the appropriate conflict post-it notes.

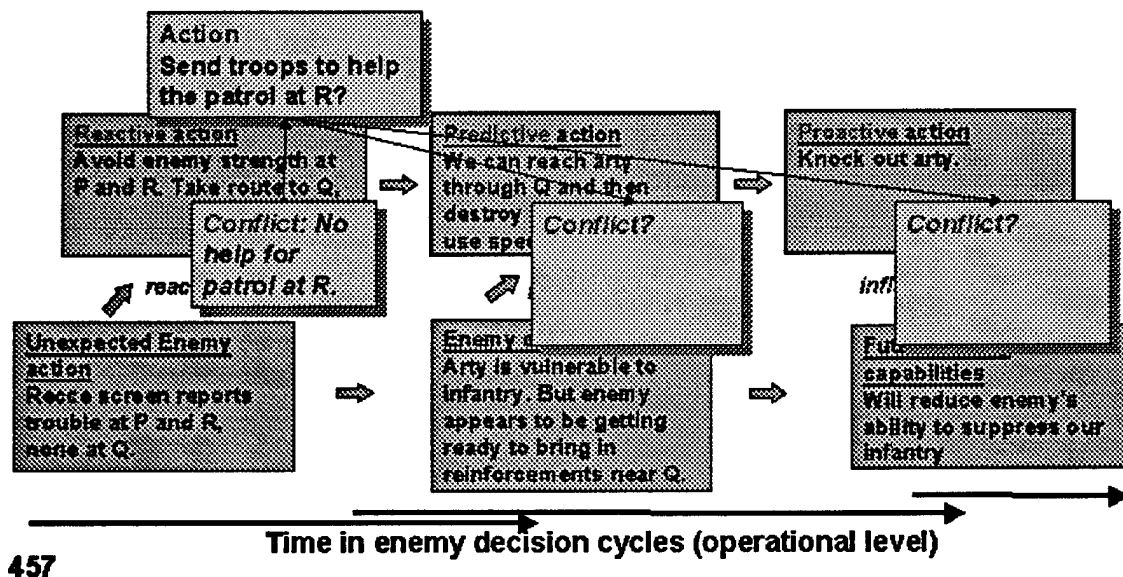
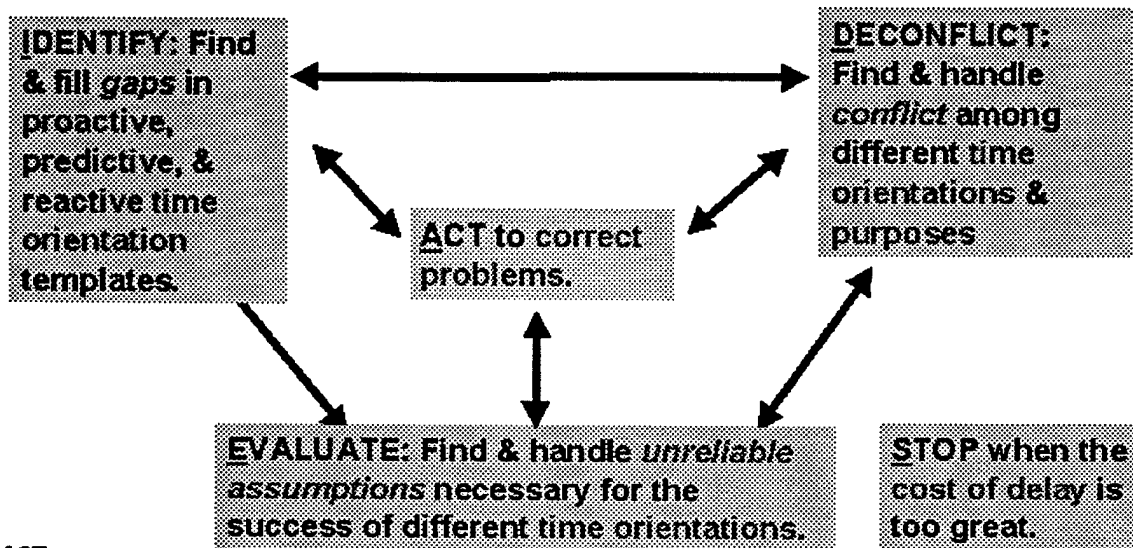


Figure 22. An exercise applying critical thinking to maneuver warfare tactics.

The next section in this segment explores critical thinking about maneuver warfare tactics more closely. It explores how each phase of the I.D.E.A.S. cycle can help address problems to which highly initiative-oriented maneuver tactics can lead (Figure 23).

## I.D.E.A.S. for Maneuver Tactics

**Critical thinking about maneuver warfare involves specific strategies for filling gaps, finding and handling conflict, and dealing with assumptions.**



467

Figure 23. Applying the I.D.E.A.S. cycle to maneuver warfare.

Specific problems in applying maneuver warfare tactics are addressed in detail: (1) Reactive and predictive orientations can conflict, for example, if speedy reactions leave units with unprotected flanks (Figure 24). This is an example of a more general problem with taking initiative in the absence of complete communication or advance coordination. Assumptions must be made about the actions taken, or the success realized, by other friendly units, and these risks must be weighed against the potential advantages of quick reaction.

## Conflict: Reactive vs Predictive

Another conflict in maneuver warfare may arise between (1) responding rapidly to opportunities and (2) coordinating with other units. *Local Initiative* leads to the risk of becoming *Isolated and cut off*.

**Conflict:** In moving quickly to the enemy rear, we may lose mutual support from other friendly units; may find ourselves cut off from our lines of communication, or subject to a flanking attack or envelopment.

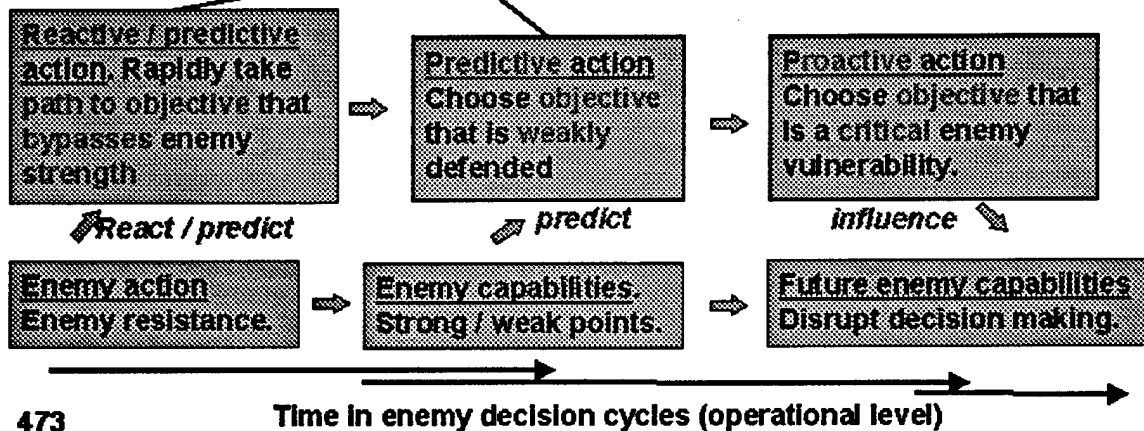


Figure 24. Risk of loss of coordination associated with rapid reaction.

(2) Predictive and proactive orientations can conflict if normally high-leverage targets, such as command and control and logistics, are in fact not weakly defended. A greater emphasis on preparation and coordination rather than tempo and surprise may be required when this is the case.

(3) Maneuver tactics choose speed of action over coordination among friendly units, and as a result incur certain risks. These tactics include ways to use all three time orientations to compensate for the risk caused by lack of coordination: by rapidly reacting to signs of existing enemy weaknesses, by exploiting them before the enemy can respond, and by creating new enemy weaknesses through high tempo and surprise and by striking high-leverage targets. Success on all these fronts depends, however, on a number of assumptions: that rapid movement can be executed given the terrain, weather, equipment, and enemy resistance; that predictions about weakness are correct, e.g., that apparent gaps in enemy front lines are real rather than traps laid by the enemy to suck us in; that shock tactics will have the intended psychological effects on this particular foe, causing them to collapse rather than hunker down; and that the enemy really does depend critically on the targeted command and control and logistics capabilities. Failure of these assumptions can turn promising initiative into disaster. Students get practice making these kinds of tradeoffs in exercises in which high levels of initiative involve a cost in communication and coordination (Figure 25).

## Proactive By-Products as a Solution

You cannot afford to forget the enemy entirely, however. Achieving shock and fear is not guaranteed. In fact it depends on assumptions about the enemy!

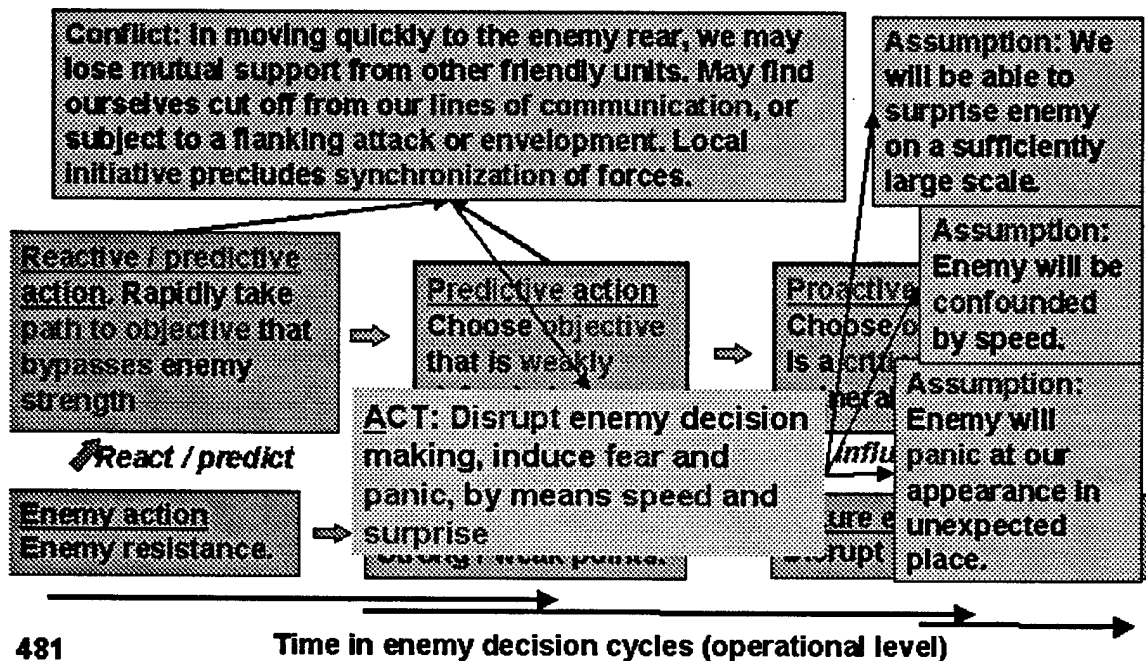


Figure 25. A possible answer for the problem of Figure 24 (see the yellow *conflict* box) is shown in the aquamarine *act* box. Some assumptions upon which its success depends are shown in yellow *assumption* boxes at right.

## AUTOMATED TRAINING SYSTEM DEVELOPMENT

For purposes of this research, we distinguish three software systems:

- 1) The *Training System*, which is the mechanism by which *training content* is delivered to students. It consists primarily of a hyperlinked table of contents, slides which are the training content, and links to the ARISLE scenario materials and Army MDMP documents. The training content may be accessed directly using Internet Explorer or Netscape (versions 4.0 and up).
- 2) The *MENTal MOdeler* system (MEMO), which is both the *tool* by which subjects will perform *training exercises* on a computer system and, beyond that, represents the early stages of an effort to explore *mental models* as a new, cognitively valid and empirically tested *modality* for human computer interactions (HCI). We will talk about both aspects of the Mental Modeler, and the role of critical thinking and other metacognitive behaviors in HCI.

As a tool, MEMO is implemented as a Java application. While it is in principle cross-platform, it relies on Java version 1.2, which is currently available only for the Windows and Sun environments. A Linux based release is expected by year end, 1998. The MEMO system is too complex for a Java applet, and has been implemented as a full-fledged application. The consequence of this is that the user must download this tool and install a current release of the Java RTE (Run-time environment). On-line documentation for the MEMO system is provided.

- 3) A computational model of the Recognition / Metacognition concepts. For historical reasons, we refer to this as the *Hybrid reasoner system*. It consists of both a recognition system and a metacognitive system (see Section 2 above for theoretical discussion), each implemented within a connectionist architecture. The ongoing development and history of the hybrid system is presented at: <http://www.cog-tech.com/hybrid/index.html> The system and its relationship to the present research is discussed below.

CTI has conducted an iterative series of experiments with Army personnel using the training system and paper and pencil exercises. While these experiments have helped us to refine the training content, they have also provided a rich source of constraint on the ways and kinds of mental models that may readily be interpreted and expressed. These experiments will be continued using the Mental Modeler (in place of paper and pencil) and the training system itself will be integrated into the CGSC core curriculum. Beginning November, 1998, we will be working with CGSC course authors LTC Hadfield and LTC Lcomb to adapt the existing training materials to the particular requirements of their course offerings. Course authors at the CGSC require authoring tools so that they can adapt and extent the training materials in response to their individual courses and feedback from students. We are currently developing such a tool using the MEMO system. It is discussed in more detail in the section on authoring tools, as part of the discussion of the training system.

At present, the training system and the MEMO tool are separate software components. This has both advantages and drawback. These are:

- The commercial browsers are more feature complete, resulting in better and faster rendering of HTML content and display of the training slides.
- The training content may be viewed remotely by anyone with access to a recent version of IE 4.0 or Netscape Communicator. However, they will not be able to work the exercises without access to MEMO. MEMO has, at present, more restrictive requirements than the training system: Windows and Java 1.2.

### Training System

As a software system, the present training system is conceptually quite simple -- most of the effort has gone into developing the training content. The training system is a collection of GIF format slides which are interconnected by a hyperlinked table of contents, implemented with JavaScript. Additional links are provided for the ARISLE scenario and hyperlinked Army Military Decision Making Process (MDMP) documents.

We are currently developing a more advanced training platform, which will include authoring tools and interactive exercises. This updated training platform will be



implemented within the mental modeler tool (MEMO), which is itself a Java application. Training developed with these authoring tools will run entirely within MEMO and will support interactive exercises. We will also permit authors to export their training materials as JavaScript.

The advantage of JavaScript is greater content dissemination; its drawback is that it can not support interactive exercises. By supporting both a MEMO version of the training content, and a JavaScript version, we will give course authors the capability to both develop interactive content and broadly disseminate the core training materials. For example, JavaScript based content can be accessed directly from a web server using a 4.0 version of either Microsoft Internet Explorer or NetScape Communicator. In contrast, to use the interactive training system, users must download and install the mental modeler tool as an application on their own system.

The rest of this section will discuss the current (JavaScript-based) training system. This discussion of the training system will also hold for the advanced training platform, except that interactive exercises will be available when using the MEMO-based training system.

### Overview of current training system

The training system is structured into three browser frames, which are (1) a TOC (Table Of Contents), (2) a content view and (3) a navigation view. An image of the training system is provided below, as Figure 26, for easier reference. In that image, one can see that the TOC fills the left-hand side of the training display; the *content view* fills the bulk of the display, and lies to the right of the TOC; finally, the *navigation view* is at the bottom of the display. The current selection is always displayed in red, while all other active links are displayed in blue. In the printed image of the training system, the red is rendered as a less visible font. The current selections in that image are "Training to Think Critically on the Battlefield" (in the TOC) and "Training" and the "Long" version in the *navigation view*.

The student views the training content by either (a) choosing among the topics listed in the TOC view or (b) progressing sequentially through the training materials using the Forward  and Backward  arrow icons found in the right-hand side of the *navigation view*. Each "slide" in the content view belongs to some high-level topic in the TOC. In the Figure 26, you can see that this copyright slide belongs to the first section of materials in the TOC. As a result, that section is expanded and displays the various sub-sections that lie within its scope. When a section can be further expanded, it is always marked by a small black triangle pointing to the right: ▸. If the section is already expanded, then the triangle points down instead: ▼.

We make three basic sets of content resources available to the student. Each of these is associated with a different TOC, and the student chooses which materials to navigate by making a selection in the navigation view. These are, with reference to the sample view of the training system:

- "Training" -- Critical thinking training for Army Battlefield command. These materials have been developed by CTI under the present contract and include both training content and sample exercises. This is the section



selected in the sample image, and we are seeing the copyright slide at the start of the training materials.


- "Practice Scenario" -- A detailed practice scenario, known as the ARISLE scenario -- this scenario provides the student with background materials which are used to motivate a number of the discussions in the training content and are used to develop exercises for the student.

We have extended the scenarios (with LTC Hadfield at CGSC) to include a series of Quick Decision Exercises (QDXs) that are designed to test critical thinking skills in realistic and time-constrained environments.

- "Military Decision Making Process" -- A hyperlinked version of the MDMP materials (currently, Chapter 5 of *FM 101-1*). These are provided solely for ease of reference by the student.

In addition, the student is able to choose among three levels of detail for the critical thinking training materials. Labeled, "Short", "Medium", and "Long" in the *navigation view*, these three levels provide a progressively more in-depth approach the training content. The Short sequence is most suitable for a brief, high-level overview of the training materials. The Long sequence is intended for students actually working their way through the training materials. The Medium sequence might be used for a detailed review of the key concepts presented in the training.

The student viewing the training materials with a smaller screen has the option to hide the TOC in order to provide more room to display the central training content. In order to hide the display of the TOC, the student uses the  icon. To cause the TOC to be displayed again, the student uses the  icon.

A help system is also available. It has contents that explain the navigational mechanisms, including the table of contents, and the meaning of the different icons that are used in the training system. The help system is accessed through the  icon.



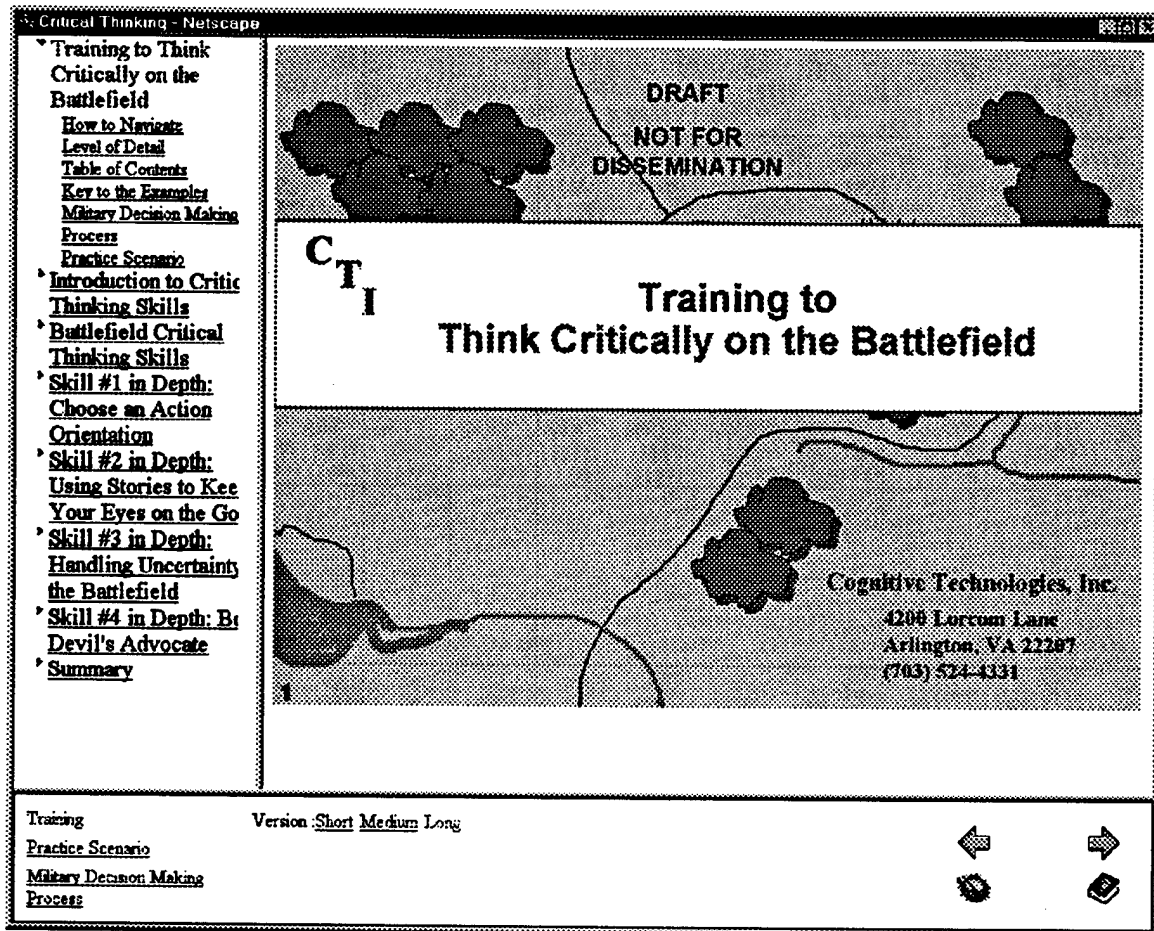


Figure 26. The initial screen of one version of the Training System. Table of contents is on left, and navigation bar at the bottom.

## **5. INITIAL EVALUATION OF TRAINING SYSTEM PROTOTYPE**

### **METHOD**

The Method section is divided into three sections. The first section provides a brief background description of the participants. The second section briefly describes the Arisle scenario that participants were asked to solve prior to working with the prototype training system. And the third section briefly describes the data collection and analysis procedures.

#### **Participants**

Seventeen active duty Army officers (rank of major or lieutenant colonel) at four different posts (Ft. Bragg, Ft. Riley, Ft. Carson, and Ft. Stewart) individually reviewed and critiqued prototype versions of the training system between March and September of 1998 in an effort to incorporate the opinions of senior-level personnel. All participants had completed their course work at CGSC, been on battalion and/or division staffs, and had combat experience and/or experience in a number of military training exercises. So, they clearly had the expertise to do the Arisle scenario and critique prototype versions of the training system.

#### **Scenario**

Prior to working with the prototype, the officers were asked to solve the Arisle Scenario developed by Dr. Rex Michel of the Army Research Institute (ARI). The scenario required the participants to recommend a course of action (COA) for regaining control of an island from an enemy force.

The scenario begins with participants being told that they are the new G-3 of the 105th Air Assault Division, and it's the morning of 22 March. The Division is engaging in OPERATION POST HASTE in support of the island of Arisle, which has been invaded by forces from the neighboring island of Mainlandia. The United States (US) was caught somewhat off-guard by the invasion, and contingency planning had not been completed for such an event.

The participants are given a briefing package containing the following information:

- (1) The Road to War: a summary of the events that led up to the present situation.
- (2) Mission Description – OPERATION POST HASTE: Summary of the execution order from the JCS to the Commander of the operation, Vice Admiral Coaler.
- (3) Intelligence: A G-2 summary of the situation as of 0630 this morning.
- (4) Status of Forces: G1/G4 summary of the friendly forces and equipment available.
- (5) Commander's Estimate of the Situation (partially complete)
- (6) Description of Arisle: A G-2 report covering topography, hydrography, vegetation, climate, infrastructure, demography, government, and economy.

In addition, participants had access to a large wall map of Arisle containing available information about the disposition and composition of enemy forces, including hostage sites. The participant's task was, as the Division G-3, to complete the estimate of the situation by developing and wargaming course(s) of action (COAs) for the invasion of Arisle by the ground forces. In particular, the Division Commander expects a recommended COA as well as justification for it.

A detailed description of the scenario, and a copy of the materials given to the participants that are listed above, can be found in the Appendix. Here we present some of the key points from the Execution Order, a brief description of the island, and key points from the Commander's Estimate of the Situation.

The first paragraph of the Execution Order reads as follows:

The President of the United States directs that you proceed with all reasonable haste to retake the island of Arisle from the Mainlandia forces now in control of the island. It is vital to the interest of the United States and its allies that the freedom of Arisle be restored before the government of Mainlandia can gain sufficient international backing to make the restoration of full independence probable. The CJCS had also ordered that the island be under US forces control by 2400 25 March (bold for emphasis here). The CJCS had further stated that it is unlikely that any significant additional combat elements could be brought to bear within this timeframe—we will have to work with the forces available. H-Hour is 0300 24 March; consequently, there are 45 hours to complete the mission

A schematic of the island is presented in Figure 27. The capital city is Beauqua, which is located in the south near the American Compound, the Oregonium mine, and airport. The other major city is Mar Blanche, located in the north near the pineapple plantation in Nipponia, and the thick teak forest. The central ridgeline connecting three mountain peaks divides the island in two. The ridgeline is heavily defended, particularly with enemy artillery, because of its excellent field of fire and observation. The majority of the enemy's ground forces, which are out-numbered by the US force and its overwhelming combat power, are spread around the perimeter of the island patrolling the shoreline.

144 foreign nationals being held as hostages by a paramilitary force called the Noclas. They are being held in groups of six to eight at locations important to the Mainlandia retention of the island. It is impossible to attack their air defense or artillery positions, the airfield, port facility, or water and power sources by indirect fire without almost certain hostage casualties. The fanaticism of the Noclas works to their advantage in this situation as well as the fact that the military command on Arisle does not control them. It is almost certain that the Noclas would kill the hostages even if the military capitulated. A 40 person Navy SEAL platoon is on Arisle providing intelligence information; they have located all hostages and have been tasked with freeing them prior to H-Hour.

There is no way that Mainlandia could have hoped to hold out for long against superior air, naval, and ground forces which the US could quickly buildup in the area. It is believed that their intent all along was to use the hostages to avert any large-scale counterattack until they could convince the other FOCOP nations to intervene economically, or even militarily, on their behalf. Their well-planned diplomatic offensive is apparently meeting with more success than we thought possible. Intelligence sources within FOCOP claim that the organization will most likely take actions to support Mainlandia within the next two days. Given these likely actions, the most probable intent of Mainlandia is to keep the US from gaining control of Arisle until a diplomatic success is assured. Their best bet for doing this is the threat of the loss of the hostages and of high US casualties in retaking Arisle.

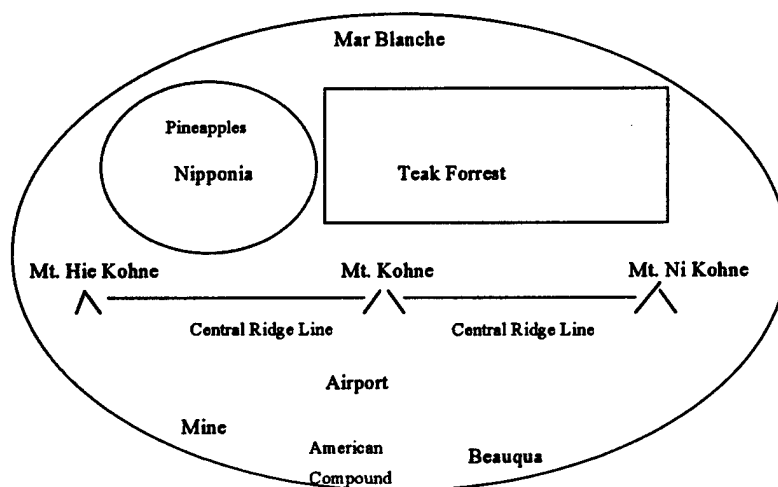


Figure 27: A schematic of Arisle.

### Procedures

Participants had a maximum of three hours to recommend their COA and the justification for it, although many completed the task within two hours. The sessions were tape-recorded. Time and resources permitted us to transcribe and analyze the sessions for nine participants. These participants were coded as follows:

- P#1 = Participant #3 from Ft. Riley (20 May 1998)
- P#2 = Participant #1 from Ft. Carson (7 July 1998)
- P#3 = Participant #2 from Ft. Carson (8 July 1998)
- P#4 = Participant #3 from Ft. Carson (9 July 1998)
- P#5 = Participant #1 from Ft. Stewart (8 September 1998)
- P#6 = Participant #2 from Ft. Stewart (9 September 1998)
- P#7 = Participant #4 from Ft. Stewart (11 September 1998)
- P#8 = Participant #4 from Ft. Bragg (26 March 1998)
- P#9 = Participant #5 from Ft. Bragg (27 March 1998)

The transcripts for the first seven participants (who received a similar version of the training system) were analyzed to identify the possible effects of training, i.e., changes in situation understanding or planning that occurred during use of the training system, compared to the initial course of action developed before receiving the training. Additional analyses were conducted to explore the situation understanding and decision making processes of the participants in more depth. In particular, we analyzed similarities and differences in how the nine participants (1) understood their mission, and especially, whether they drew on reasoning about high level *purpose* in framing the Arisle scenario, and (2) their recommended Course of Action (COA) and how this was effected by their

understanding of the mission and purpose. In addition, the transcripts for the first seven participants were analyzed to identify similarities and differences in how they answered questions posed by the prototype system to address critical thinking skills. (The two participants from Ft. Bragg were not included in the latter analysis because it was based on questions that were modified considerably after the Ft. Bragg interviews.) These analyses are summarized in the Results section below.

## RESULTS

### Insights Induced by Training System

*Six of the seven participants who worked with the same prototype training system (i.e., P#1 – P#7) had significant insights about how they performed the Arisle scenario while working with that training system. Three of the participants (P#1, P#3, and P#4) actually modified their recommended COA to address the identified deficiencies. This section documents the new insights achieved by P#1 through P#6 during the training. In the absence of proper controls, there is, of course, no way to prove that these insights were brought about by use of the training system rather than, for example, by spending more time on the problem. However, each of the insights described below occurred in conjunction with use of the *specific* training module that was designed to elicit precisely the type of insight that occurred. This strongly suggests that, at a minimum, the training played a role in eliciting insights that might (or might not) have occurred anyway.*

The systematic evaluation of his assumptions caused P#1 to modify his recommended COA. Specifically, P#1 said his biggest assumption was that the special operations forces could get the hostages off of the island. When asked if this assumption was important, he replied, "My goals are little collateral damage, get the hostages out safe, and destroy his forces. I won't get the hostages out safe if I lead with gun ships, which my plan does, and the hostages are there. I won't accomplish my goals." At this point, he said that he would change his recommended COA in two ways. First, he'd create "no fire areas" around certain key sites containing hostages to enhance their safety until he knew that the SEALs freed them. Second, he'd look at the MEU's special operations capabilities. (His COA already had the Rangers as a reserve to help free the hostages, and had focused on disrupting and destroying the enemy's command, control, and communications.)

The use of the crystal ball technique caused P#2 and P#5 to gain insights about one of their most important assumptions, which was that they would be able to suppress the enemy's air defense artillery (ADA) effectively. We consider each participant in turn.

P#2 said that this assumption was critical to accomplishing his goals, which were to eliminate the enemy's ability to influence friendly forces and, thereby, secure the island. For, as he pointed out, if you lose aircraft carrying troops, the mission may become unattainable. Yet, when we started the crystal ball technique, P#2 was convinced that failure to suppress the enemy's air defense could only be due to two reasons: bad intelligence or that the enemy was very effectively dug in. When we finished, he had added bad weather and "... equipment failure or tactics, which would include the weapon systems and munitions that we employed against their systems. Okay, I guess I didn't consider that."

P#5 was absolutely convinced that the US force could destroy the enemy's air defense assets. At the beginning of the Crystal Ball technique, he could think of only two ways that a majority of the enemy's ADA could survive the initial attacks on it. First, bad intelligence regarding its location; second, that the enemy was simply better than we thought and consequently, we were having trouble killing individual pieces of equipment. When the researcher said, "The crystal ball says it's not either of those two reasons," P#5 didn't know how to respond and said, "Everything I can think of would tie into one of these two." However, when the crystal ball exercise concluded about 15 minutes later, P#5 had identified five additional reasons why a majority of the enemy's ADA could survive. During the evaluation session, P#5 said, "The crystal ball is one of the sections I'd push the most because that's certainly one of the things I've seen, which is the ability to do good war gaming, [that] is truly limited."

P#3 identified a number of important information gaps in his thinking about the Arisle scenario when reviewing that module of the prototype. In particular, he pointed out to the researcher that he had not explicitly considered the media, weather, tides, the rules of engagement, or the enemy's most dangerous COA when developing his COA. He was particularly upset about not considering the media. "I should have considered [it] because it's critical to achieving my goal!" He said that he'd now fill this gap by systematically interacting with the task force's Public Affairs officer.

P#4 became increasingly concerned about his "Phase 1" plan for preparing the battlefield, which involved destroying the enemy's air defense assets and his artillery, particularly along the central ridgeline, as the training progressed. When asked the reasons against his COA he answered, "If Phase 1 is not successful, then the entire mission might not be successful." Yet, he had no contingency for it; he had just assumed that Phase 1 would be successful. However, later in the Story module, he began talking about how he might use the attack helicopters to help do Phase 1. Later during the "Identify Gaps" module, he realized that he didn't know (and may be could never know) where all the enemy's shoulder-fired ADA were located. This greatly concerned him because, "I'm relying on the Rangers to jump in [at night on to the central ridge to destroy the enemy's fire support], and if one of those shoulder-fired missiles shot [down] a C-130, I'd lose an entire company." Finally, after the Crystal Ball technique, P#4 actually changed his COA to include a ground-based contingency. Specifically, in addition to now having the attack helicopters ready to support Phase 1, he'd tell the air assault brigade to be prepared to send one company to attack 1 to 3 artillery batteries if the Rangers were unable to take them out; for example, because they were shot down.

P#6 improved his communication of how he was linking higher- and lower-level goals during the Story module. Specifically, when he was asked what his goals were early in the Story module, he focused only on lower-level, tactical goals, such as eliminating or suppressing the enemy's air defense, and removing the enemy's ability to communicate. By the time that discussion of the Story module ended, P#6 was specifically describing how these lower-level goals were linked to his top-level goals of securing the island, removing the enemy's legitimacy for being in Arisle, and, hopefully, getting the enemy force to surrender with minimal fighting. This description made it much easier to see how his recommended COA, which focused only on controlling the southern portion of the island, was connected to his goals.

### Purpose, Time, and Mission Interpretation

Consider the literal wording of the mission, as articulated by the immediately higher headquarters:

The CJCS had also ordered that *the island be under US forces control by 2400 25 March.* [italics added]

This statement specifies the mission as (i) placing the island under US forces control (ii) within a specific time limit.

*Participants differed in how they interpreted the mission, i.e., in how they defined what "control of the island" meant.* In particular, five of the nine participants (P#1, P#5, P#7, P#8, and P#9) defined "control of the island" as regaining military control of the entire island and destroying the entire enemy force (above a certain size, e.g., platoon). The other four participants (P#2, P#3, P#4, and P#6) defined "control of the island" as controlling the southern portion of the island, where the capital, American compound, airport, Oregonium mine, and port were located. All participants emphasized destroying the enemy force along the central ridgeline and in the south (since enemy anti-air and artillery on the ridge line also threatened any action in the south). We will consider these two groups in turn.

*Control entire island.* Participants in this group differed in how they arrived at their interpretation of the mission. For a few participants, there appears to have been little or no ambiguity in the mission statement. They felt that they were following its literal, direct meaning. For example:

Participant #7: Destroy the enemy and *regain control of the entire island* as quickly as possible.... Being objective-oriented by going after the enemy and reducing his ability to continue combat operations... The mission analysis was pretty clear; destroy the enemy and regain control of the island.

Participant #8: To *seize Arisle* by deadline

Participant #9 *Seize Arisle* no later than 2403 March to *deny Mainlandian forces opportunity to gain international backing.* ("Seize" means control of island & destruction of enemy force, or their withdrawal or surrender.)

These participants appear not to have considered the higher-level purpose or context of the mission – or, if they did consider it (e.g., the reference to international backing by participant #9), it had no discernable influence on their interpretation of the mission.

One participant, however, not only considered the higher-level purpose of the mission, but used it to justify aiming for military control of the entire island and destruction of the enemy force:

Participant #1: The American center of gravity is not just the mine, but *the whole perspective of how could Mainlandia have the audacity to do this.*  
Given that, we want to *take the entire island.*

*Control southern part of island.* Another group of participants departed from the literal interpretation of the mission statement, and defined control of the island more narrowly, as seizing the southern part only. Two of these participants were motivated in

their redefinition of the mission by consideration of the higher-level political context and purpose:

Participant #4: seize the *political center of gravity*, which is the capital and airport.

Participant #6: Enemy's center of gravity is "a show of strength" in capital near the American Compound. It gives him legitimacy, and I want to remove that legitimacy. That's why I consider that area, capital, airport, and compound as main effort.... Since they'll have no reasons for being there, they'll surrender.

A crucial additional motivation for the narrower interpretation of the mission was an assessment that securing the entire island within the specified deadline was not feasible. All four participants who chose a narrow interpretation of the mission (i.e., controlling the southern part of the island only) argued in some form that the limited objective was the most expeditious way to achieve the overall purpose of the mission:

Participant #2: We are eliminating the enemy's ability to influence our actions, isolating him, and killing him... [so, avoiding prolonged fight]

Participant #3: Once south is controlled, including communications., it's just a matter of time before they surrender.

Participant #4: Avoids the enemy's strength in north to avoid an attrition battle [which may be prolonged]

Participant #6: Exploit their weaknesses and avoid their strengths... [to avoid getting bogged down]

One participant (#5) was intermediate between the two groups. He interpreted the mission as seeking to control both northern and southern parts of the island, but did not take the enemy force in the northern forest as his objective:

Participant #5: First center of gravity, and most important goal, is to *control island* within 48 hours... [including] urban centers in the north and south ... By getting into the airport, the mine, and urban centers, I was proactive with respect to preventing their destruction, and with respect to the media and my diplomatic goals... My COA enables us to do that with minimal cost or troops being bogged down in field.

Thus, participants who interpreted the mission as controlling the southern part of the island (or, at least, as not requiring a direct attack on enemy ground forces in the northern forest) typically did so as a result of a critical thinking process in which they considered (i) the political context, and (b) the difficulty of clearing out the entire island within the 48 hour time limit.

#### **Purpose, Time, and Mission Interpretation**

There were significant differences in the participants' COAs, and these were influenced how they *interpreted the mission*. All participants who defined "control" as control of the entire island sent forces to either secure or seize Mar Blanche, the northern



city of Arisle. None of the participants who defined "control" as control of the southern part of the island did so.

In addition, 3 of the 4 participants who defined "control" as control of the southern part only (i.e., P#2, P#4, and P#6), sent ground forces to seize the central and/or western mountains along the ridgeline as part of the initial attack. None of the five participants who defined "control" as regaining the entire island did so. This is probably because the former needed to remove the threat to southern mobility posed by forces on the ridgeline. The latter group all sent forces against Mar Blanche, and in two cases against enemy forces in the pineapple plantation of Nipponia (northwest part of island), as part of the initial attack instead.

Table 9 shows the correlation between mission interpretation and key elements of the course of action. In particular, most participants were both proactive and predictive to some degree and in certain respects, but differed in what those respects were. Participants who defined the mission as controlling the southern part of island tended to be highly proactive; they sought to induce the enemy to surrender by influencing the enemy's motivation or reason for staying on the island. They were predictive in the sense that they sought to avoid enemy strength and attack enemy weakness (in order to achieve the mission in the required time, and to minimize casualties). On the other hand, participants who sought to control the entire island were proactive in a more limited sense: eliminating the enemy's ability to resist by destroying its forces. Prediction also influenced their course of action, but in the opposite way: They sought to attack rather than avoid enemy strength.

Table 9. Relationship between course of action and mission interpretation

Participant #	Mission Interpretation  Control of entire island =1; control of critical points in south = 2	COA Time Orientation	
		Proactive	Predictive
		Destroy enemy troops = 1; induce enemy to surrender = 2	Attack enemy forces in north = 1; Avoid enemy forces in north = 2
1	1	1	
5	1	2	1
7	1	1	1
8	1	1	
9	1	1	1
2	2		
3	2	2	2
4	2	2	2
6	2	2	2

Although the way that the participants framed the problem significantly affected their recommended COA, there was still significant COA differences among participants who framed the mission the same way. For example, P#2 and P#3 defined "control of the island" as control of the southern part of the island. Yet P#2 sent ground forces against enemy troops on the mountains; P#3 didn't. Also, P#2 did not seize the airport, which is what P#3 did. And although both had the MEU landing in the south, P#2 had them landing at the small beach below the American compound to secure it and the capital. In contrast, P#3 had the MEU landing at the beach below the mine to secure the mine; he let the air assault BNs secure the capital. The point is that although both officers framed the mission the same way, had the same goals, focused on the same situation features, and tried to connect their COA to all of this, they still recommended different COAs. Since we have no way of knowing whether one COA is better than another, we simply assume that *they represent different, yet comparable ways of achieving the same goals.*

Only 4 of the 9 participants (i.e., P#1, P#3, P#7, and P#9) generated and evaluated 2 COAs. One of the four (P#7) refused to say which one he'd select; he said he'd send both of them to the Plans shop for further development. The other three participants selected the second COA that they developed as their "recommended COA." Three of these four participants (i.e., P#1, P#7, and P#9) defined "control" as regaining control of the entire island. One of them (P#3) defined it as regaining control of the southern part only.

Participants were reasonably consistent in how they defined their "situation goals" in answer to our questions about the Arisle scenario later in the session. There were three secondary goals to the mission in addition to the primary goal of "controlling the island:"

- Safely freeing the hostages;
- Minimizing casualties; and
- Minimizing collateral damage.

All nine participants mentioned "freeing the hostages" as a concern. The other two secondary goals were not discussed explicitly by many of the participants. Five of the 9 participants explicitly discussed minimizing casualties at length; four explicitly discussed minimizing collateral damage at length.

#### **Time Orientation and Consensus on Courses of Action**

Participants also specified key "situation features" in answer to questions about the scenario. All participants agreed that the following were key situation features during their mission analysis:

- Enemy force spread out across island;
- Enemy's fire support (i.e., artillery) on the high ground;
- Enemy air defense assets;
- Enemy's command, control and communications; and
- The hostages

There was considerable agreement among the participants' COAs with respect to how they dealt with the above situation features, except for the hostage situation. For example, all participants tried to

- Move quickly and decisively by using simultaneous attacks (or near simultaneity in one case) against the spread-out enemy force;
- Eliminate a considerable portion of the enemy's fire support before (and shortly thereafter) inserting ground forces;
- Eliminate the enemy's ADA before inserting ground forces; and
- Eliminate (or use) the enemy's command and control.

As Table 10 shows, the almost uniform response to these key situation features was adoption of *proactive tactics to influence the enemy's ability to make use of an associated capability*. For example, dispersed attacks would keep the enemy from concentrating; air strikes and naval gunfire would eliminate enemy fire support and anti-air before it could be used; and enemy command and control would be knocked out to prevent the enemy from fighting in a coordinated fashion. The most remarkable thing about these proactive tactics (plus the plan to act at night) is the high level of agreement among participants.

Table 10. Number of participants planning specific proactive actions.

# participants	Proactive					
	Simultaneous attacks to keep enemy from concentrating	Destroy arty & ADA with air strikes &/or naval gunfire	Destroy or use enemy C2 to prevent coordination	Act at night to influence enemy	Destroy enemy reserve	Control mine to reduce enemy motivation
	9	9	9	9	6	4

As shown in Table 11, on the other hand, there was much more disagreement with respect to actions based on *predictions* of enemy intent, as opposed to the *proactive* efforts to influence enemy intent. Information gaps, e.g., predictions of enemy intent, were only addressed if the participant considered them to be a weakness in his COA. For example, P#1 repeatedly mentioned that "knowing enemy intent" was an information gap. But he later admitted that he really didn't care that much about it because he was going to hit the enemy with air strikes and simultaneous attacks to overwhelm him, regardless of his intent. In contrast, extraction of the hostages (and the assumption that the SEALs can free them) was a gap he kept trying to fill, because it was an important precondition for his ability to carry out the mission without delay.

All nine participants mentioned "freeing the hostages" as a concern, as mentioned above. Moreover, all participants resolved goal conflict – between primary mission accomplishment and freeing the hostages – in favor of primary mission accomplishment. On the other hand, participants differed dramatically in their predictions of whether this would be accomplished, and in what they planned to do about it. Only five of them (P#1,

P#2, P#5, P#7 and P#9) seemed to have explicitly stated tasks for helping the SEALs rescue the hostages. Note that four of these 5 participants had defined "control" as regaining control of the entire island, so this may simply reflect a tendency to literal interpretation of the mission and thoroughness (or lack of true prioritization) in addressing every detail. In this respect, it is interesting to note that P#1, P#7, and P#9 seemed to emphasize all three secondary goals, as well as the primary mission. And P#5 emphasized two of them: freeing the hostages and minimizing casualties. All four of these participants (P#1, P#5, P#7 and P#9) defined "control" as regaining control of the entire island. (We realize that our sample size is small, but we thought this was interesting nonetheless.)

Table 11. Number of participants planning specific predictive and predictive-reactive (i.e., contingent) actions.

	Predictive			Predictive-Reactive
	Take advantage of fact that enemy is spread out & divided by terrain.	Civilians will be in cities, so don't attack there first.	Take account of prediction that enemy will move forces into the forest after attacks begin.	Adjust plan if SEALs fail.
# Participants	7	4	3	5

### Self-Identified Time Orientation

In response to questions from the researcher, participants identified, on average, 4.4 proactive actions as being in their recommended COA, 3.1 predictive actions, and 2.1 reactive actions, for a mean total of 9.7 actions. A repeated measures t-test found the difference between the mean number of proactive and reactive actions to be significant at the  $p < 0.01$  level for a two-tailed test [ $t(6) = 4.39$ ]. None of the other differences was significant at the  $p \leq 0.05$  level.

The above analysis simply adds the number actions identified by each of the participants. For example, if one simply adds the number of proactive actions, then the participants identified a total of 31 proactive actions (i.e.,  $7 \times 4.4$ ). However, two (or more) participants identified the same 20 (of 31) proactive actions (i.e., 65%). This means there were only 11 distinctly different proactive actions. Through a similar analysis, we identified that there were 15 distinctly different predictive actions and 10 distinctly different reactive actions.

The results shown in Table 12 confirm the observation made in the previous section that there was more consensus among participants with regard to proactive tactics designed to influence enemy actions or capabilities, than with regard to predictive tactics

based on expectations of enemy action or strength. Table 1 lists the number of distinctly different proactive, predictive, and reactive actions identified by three or more participants, by two participants, and by only one participant. Examination of this table shows that three or more participants identified 5 of the 11 distinctly different proactive actions (i.e., 45%). In contrast, three or more participants only identified 1 of the 15 different predictive actions (7%), and only 1 of the 10 reactive actions (10%). Even more strikingly, two or more participants identified 9 of the 11 proactive actions (i.e., 82%). In contrast, two or more participants identified only 5 of the 15 distinctly different predictive actions (i.e., 33%) and only 3 of the 10 different reactive actions (i.e., 30%).

A chi square test was performed on the data in Table 12 to assess if the degree of similarity for the proactive actions was significantly different than that for the predictive and reactive actions. The results of that test were significant statistically ( $\chi^2 = 10.03$ ,  $p < 0.05$ ), providing some statistical support for the position that the participants agreed more on the types of proactive than predictive or reactive actions they identified as being inherent in their recommended COAs.

Table 12. Degree of Similarity in participant-identified Proactive, Predictive, and Reactive Actions

Time Orientation	Actions Identified by $\geq 3$ Participants	Actions Identified by 2 Participants	Actions Identified by 1 Participant	Total Number of Different Actions
Proactive	5	4	2	11
Predictive	1	4	10	15
Reactive	1	2	7	10
Total	7	10	19	36

The 5 proactive actions, 1 predictive action, and 1 reactive action for which 3 (or more) participants agreed, are listed below.

#### Proactive Actions

- Keeping enemy divided so that he can't mass his forces, including the inability to reposition his reserves. [P#1, P#2, P#4, P#5, P#6, and P#7]
- Focusing on the enemy's artillery and air defense assets and, more generally, taking away the high ground. [P#2, P#4, P#5, P#6, and P#7]
- Going after the enemy's communications to disrupt his command and control. [P#2, P#3, P#5, and P#6]
- The attack itself was considered proactive by three participants [P#1, P#2, and P#3]
- Seizing the urban areas (specifically the capital, which was Beagua, and Mar Blanche) and the airport [P#3, P#5, and P#6]

#### Predictive Action for which 3 participants agreed:

- Predicted that enemy would move forces into the forest. [P#1, P#5, and P#6]

#### Reactive Action for which 3 participants agreed:

- We'd have to readjust significantly if the SEALs fail. [P#2, P#4, and P#5.]  
Note: P#6 explicitly said he would not adjust if the SEALs fail.

It is noted here that a separate analysis was performed to determine if participants who defined the Arisle scenario similarly tended to agree more on their proactive, predictive, and reactive actions than those who defined it differently. [The two definitions were control of the entire island (P#1, P#5, and P#7) or control of only the southern part (P#2, P#3, P#4, and P#6).] However, we failed to find a systematic relationship. For example, P#1 and P#2 agreed on four proactive actions, as did P#5 and P#6. In both cases, the members of the pair had defined "control" differently.

### Stories and IDEAS Modules

This section summarizes the analysis for the seven participants' answers to the questions about their solutions asked in the Story and IDEAS modules of the prototype training system. Appendix A provides the detailed analysis.

#### Story Module

The Story module asked participants to indicate whether or not they had used different types of stories when developing their COA. As can be seen below, *most of the participants used most of the different types of stories.*

1. Friendly Intent Story? (N = 7)
2. Enemy Intent Story? (N = 4)

P#4 and P#7 - Enemy is trying to delay Americans from quickly regaining control of Arilse and, thereby, gain a diplomatic victory.

P#5 - Enemy is going to kill the hostages and use the media to exploit it.

P#6 - Enemy's legitimacy is controlling the capital and American Compound.

3. Mission Analysis Story? (N = 7)
4. Correlation of Forces Story? (N = 7)
5. Rate of Movement Story? (N = 4: P#2, P#4, P#6, P#7)
6. Principles of War? (N = 7)
7. Action Execution Story? (N = 7)
8. Evidence Interpretation Story? (N = 4: P#1, P#4, P#6, P#7)

#### Identifying Gaps Module

*All seven participants indicated that they wanted information about the status of the SEALs and hostages.* In addition, five of the seven participants indicated that they wanted information about some aspect of the enemy force. In most other cases, the participants identified gaps unique to that person.

*In most cases, participants indicated that they would try to fill the gap by some aspect of standard operating procedures (SOP).* SOP ranged from coordination activities, such as a liaison with the Special Operations Force (SOF) to learn the status of the SEALs and hostages, or various intelligence requirements to learn about the enemy.

### **Deconflict Module**

*None of the seven participants identified the conflicting information in the written materials regarding the sophistication of the enemy's air defense assets (ADA). The researcher did not always tell the participant about the conflict. In two cases, however, the researcher did and the participants said it would not matter how sophisticated the enemy's ADA was because our air forces would still overwhelm it.*

*Six of the seven participants noticed the conflict between the goal of controlling the island quickly and freeing the hostages safely. P#1 was the only participant who did not notice the conflict because he thought we could accomplish both goals.*

### **Evaluate Assumptions Module**

*The two big assumptions were that the air and/or naval forces could suppress the enemy's fire support (i.e., artillery) and air defense artillery (ADA) assets, and that the SEALs could free the hostages. Other assumptions were unique to participants.*

### **Act Module**

*This section lists the three most commonly identified actions that the participants indicated they would take to fill information gaps or deal with conflicts. Most of the actions represent activities that are part of a task force's standard operating procedure.*

1. Stay in contact with the SEALs (N = 7)
2. Be proactive. Instead of trying to predict (or react to) enemy intent, hit the enemy with air strikes and simultaneous attacks to overwhelm them (N = 7)
3. Use various intelligence collection capabilities to obtain information about the enemy, such as human intelligence (HUMINT) from the SEALs or guys on the ground and photo imagery (N = 5: P#1, P#2, P#3, P#4, P#7).

### **Stop Module**

*This module had a number of questions. Unfortunately, all the participants did not answer all the questions, probably because this module came late in the interview session and time was running out in some cases. (P#6 did not answer any of the questions.) Therefore, only the questions answered by at least half the participants, and only the most frequently provided answers to each question, are presented below. As can be seen, the participants tended to agree in their responses.*

1. How much time would you take if this were a real situation? (Note: P#5 and P#6 did not answer this question.) Four of the remaining five participants said that they thought they could do the division-level planning within 8 hours with a staff.
2. Costs of delaying the mission? (Note: P#5, P#6, and P#7 did not answer the question.) All four remaining participants said that a delay would give the enemy time to improve his battle positions.
3. Unresolved uncertainties when start mission? (Note: P#6 and P#7 did not answer.) Four of the five remaining participants answered, "Whether SEALs have control of the hostages or even where they are." Two participants responded, "Not knowing where all the enemy's ADA is located."

4. Potential costs of not resolving uncertainties? (Note: P#1 and P#6 did not answer.) Three of the remaining five participants said, "Loose aircraft carrying troops, and take severe casualties."

**Devil's Advocate (i.e., Crystal Ball) Module**

Three participants (P#2, P#3, and P#5) identified "failure to suppress the enemy's ADA" as the problem they considered. The only reasons given that were common to the three participants were "bad intelligence" or that the enemy was better (in some way) than was thought previously. There were a number of reasons that were only generated by one of the three participants. As we noted earlier, none of the seven participants identified the conflicting information in the written materials regarding the sophistication of the enemy's air defense assets (ADA).



## **6. LESSONS LEARNED: TRAINING CRITICAL THINKING FOR INITIATIVE**

### **Initiative is vital in team performance**

Initiative is an important but neglected topic in team decision making and team training. It is a vital ingredient in situations characterized by unexpected and rapidly unfolding dangers or opportunities, and where communication is limited by spatial separation, workload, specialization of knowledge, or other factors. In such environments, leadership initiative and responsibility devolves upon teams and individuals that are ordinarily subordinate, but who are able to act more quickly and effectively on the spot. These individuals and teams need training that enables them to discriminate situations where initiative is appropriate, from other situations where coordination and communication are more important (e.g., when many sources of information must be integrated, large scale patterns of events must be interpreted, and actions must be coordinated across the organization). When initiative is appropriate, teams and individuals need to learn when and how to communicate, how to anticipate actions of other friendly units, and how to interpret information that is communicated by other friendly units.

### **Training can be based on differences between more and less experienced decision makers in real-world situations**

Development of training content for a particular domain can be based on analysis of interviews in which decision makers describe actual experiences in challenging, real-world situations. This approach reveals important differences between more and less experienced decision makers in both the knowledge they draw upon (mental models) and the thinking strategies they employ. These differences can become the focus of effective training for initiative in that domain. Moreover, there is reason to suspect that key aspects of that training will transfer across domains, such as the importance of purpose, time, and critical thinking.

### **Awareness of purpose is a key ingredient of initiative**

An important difference between more and less experienced decision makers is focus on higher-level and longer-term purposes or general principles. In non-routine situations, experienced decision makers work to clarify goals, and to modify and elaborate them if necessary. This understanding of purpose is then used to guide attention to the most critical features of the situation and to construct or select actions. Attention to purpose correlates both with experience and with the degree of initiative shown by decision makers. Attention to purpose also plays a role in *creativity* or innovation. Creativity often involves questioning or disregarding traditional, lower level goals, habits, and constraints and focusing on new ways to achieve what the organization truly values (Ray & Myers, 1986).

### **Appropriate time orientation is a key ingredient of initiative**

Another important difference associated with experience involves time orientation. Experienced decision makers make greater use of proactive strategies, and therefore take more initiative. Proactive decision makers influence the decisions of other agents (e.g., enemies, competitors, superiors, or colleagues) rather than simply predict or react to their actions. Time orientation in turn helps determine the knowledge or mental models

decision makers draw upon. Nor surprisingly, the proactive orientation is closely associated with attention to higher-level purpose. Both proactive and predictive orientations draw on mental models of intent. Both predictive and reactive orientations draw on models of team member reliability. Finally, all three orientations draw on knowledge of the sequence of actions in a task.

### **Critical thinking processes are a key ingredient of initiative**

Critical incident interviews and other research suggests that a variety of critical thinking strategies also develop with experience. These skills supplement and improve pattern recognition skills rather than replacing them with formal decision making methods. Experienced decision makers learn to verify their initial recognitional response when the stakes are high, time is available, and the situation is unfamiliar or uncertain. They learn to flesh out their understanding of a hypothesis or action by recalling or collecting relevant information. They learn to notice conflicts, in which observations fail to match familiar patterns and standard responses are not likely to achieve desired purposes. When conflict is found, instead of immediately rejecting the recognitional conclusion, they tend to patch it up by generating a story that explains the conflict. They then evaluate the assumptions required by the story, and accept, modify, or reject the conclusion based on that evaluation. For decision makers armed with these skills, initiative is the result of careful scrutiny of the standard response; the decision to deviate from it is made with full awareness of the assumptions and risks involved.

Meta-recognitional processes can be understood in terms of the intelligent shifting of attention to activate additional knowledge in the recognitional system, and the persistent application of attention to hypothetical contingencies in order to conduct what-if reasoning. Here again, there is a suggestive link to research findings on creativity. Creative thinking involves inhibiting routine responses, letting attention roam beyond the immediate associations in the situation, and challenging assumptions.

### **Training for initiative should include a focus on purpose, time orientation, and critical thinking**

A training method has been developed for Army battlefield decision making skills that focuses on these three key ingredients of initiative: purpose, time orientation, and critical thinking. The training trains less experienced decision makers to use both the knowledge structures and decision making strategies characteristic of more experienced decision makers. The training has five segments: purpose, critical thinking about purpose, time orientation, critical thinking about time orientation, and more advanced issues in deciding when to take initiative.

The training (in a previous, non-automated version) has been tested with active-duty officers in Army posts and schools around the country, and it works (Cohen, Freeman, Fallesen, Marvin, & Bresnick, 1995; Cohen, Freeman, Wolf, & Militello, 1995). A short period of training, both in Army and Navy contexts, has been consistently found to produce significantly better combat decisions, as judged by experienced officers. In addition, trained participants were able to consider a wider range of factors in making a decision, identify more evidence that conflicted with their initial recognitional response, identify more assumptions, and generate more alternative options than untrained participants.

A computer-based version of the training was enthusiastically received by the dean of the Command & General Staff College and the director of the Center for Army Tactics at the Army Command and General Staff College, Leavenworth, KA. CGSC instructors in several different courses have expressed an interest in using the material, and it has already been used in one advanced tactics course. Preliminary evaluation of the latter suggests that the training helped students identify more assumptions and adopt more robust plans in test scenarios.

**Training should combine instruction, examples, practice, and feedback**

The computer-based version of the training is accessible either through CD-ROM or over the World Wide Web, and will be suitable for classroom instruction, training in the field, or distance learning. The combination of techniques utilized in this system reinforces learning and seems to successfully accommodate differing student learning styles. For example, some student comments stressed the value of the explicit instruction, while other comments stressed the value of actual examples from military history. Most students appreciated the interactive exercises and expressed a desire for more. We are currently working on methods for providing more adaptive feedback to student responses in these exercises.

The development methods, training content, and training techniques utilized in the computer-based training are readily generalizable. There are many other domains where the performance of an organization is likely to be improved by enhancing the ability of its members to judge when, where, and how to take the initiative.

## REFERENCES

- Adams, M. J. & Feehrer, C. E. (1991). Thinking and Decision Making. In J. Baron & R. V. Brown (Eds.), Teaching Decision Making to Adolescents (pp. 79-94). Hillsdale, NJ: Erlbaum.
- Adelson, B. (1984). When novices surpass experts: The difficulty of a task may increase with expertise. Journal of Experimental Psychology: Learning, Memory, and Cognition, 10(3), 484-495.
- Anzai, Y. (1991). Learning and use of representations for physics expertise. In K. A. Ericsson & J. Smith (Eds.), Toward a general theory of expertise (pp. 64-92). Cambridge: Cambridge University Press.
- Atkinson, R.C., & Shiffrin, R.M. (1969) Human Memory: A proposed system and its control processes. In K.W. Spence & J.T. Spence (Eds.), The psychology of learning and motivation (Vol. 2). New York: Academic Press.
- Baron, J. & Brown, R. V. (Eds.). (1991). Teaching Decision Making to Adolescents. Hillsdale, NJ: Erlbaum.
- Blau, P.M. (1970). A formal theory of differentiation in organizations. American Sociological Review, 35, 201-218.
- Brown, Lesley (Ed.). (1993) The New Shorter Oxford English Dictionary. Oxford: Clarendon Press.
- Burns, T., & Stalker, G. M. (1962). The management of innovation. London: Tavistock.
- Campbell, D. T. (1974). Evolutionary epistemology. In P.A. Shlipp (Ed.), The Philosophy of Karl Popper. LaSalle, IL: Open Court.
- Cannon-Bowers, J. A., Salas, E., & Converse, S. (1993). Shared mental models in expert team decision making. In N. J. Castellan (Ed.), Individual and group decision making (pp. 221-246). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Cannon-Bowers, J. A., Tannenbaum, S. I., Salas, E., & Volpe, C. E. (1995). Defining competencies and establishing team training requirements. In R.A. Guzzo, E. Salas, & Associates (Eds.), Team effectiveness and decision making in organizations (pp. 333-380). San Francisco: Jossey-Bass Publishers.
- Chapman, M. (1993). Everyday reasoning and the revision of belief. In J.M. Puckett & H.W. Reese (Eds.), Mechanisms of everyday cognition. Hillsdale, NJ: Erlbaum.
- Chase, W. G., & Simon, H. A. (1973). The mind's eye in chess. In W. G. Chase (Ed.), Visual information processing (pp. 215-281). NY: Academic Press.
- Castellan, N. J., Jr. (1993). Paradoxes in individual and group decision making: A plea for models. In N. J. Castellan (Ed.), Individual and group decision making (pp. 125-134). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Chi, M., Bassock, M., Reimann, P., & Glaser, R. (1989). Self explanations: How students study and use examples in learning to solve problems. Cognitive Science, 13, 145-182.
- Chi, M., Feltovich, P., & Glaser, R. (1981). Categorization and representation of physics problems by experts and novices. Cognitive Science, 5, 121-152.

- Cohen, L. J. (1981). Can human irrationality be experimentally demonstrated? The Brain and Behavioral Sciences, 4(3), 510-517.
- Cohen, M. S. (1986). An expert system framework for non-monotonic reasoning about probabilistic assumptions. In J. F. Lemmer & L. N. Kanal (Eds.), Uncertainty in artificial intelligence (pp. 279-293). Amsterdam: North-Holland Publishing Co.
- Cohen, M. S. (1993). The naturalistic basis of decision biases. In G. A. Klein, J. Orasanu, R. Calderwood, & C. E. Zsombok (Eds.), Decision making in action: Models and methods (pp. 51-99). Norwood, NJ: Ablex.
- Cohen, M.S., Adelman, L., Tolcott, M. A., Bresnick, T. A., and Marvin, F. (1993). A Cognitive Framework for battlefield commanders' situation assessment. Arlington, VA: Cognitive Technologies, Inc..
- Cohen, M.S., & Freeman, J.T. (1997). In R. Flin, E. Salas, M. Strub, & L. Martin (Eds.), Improving critical thinking. In Decision making under stress: Emerging themes and applications. Brookfield: Ashgate.
- Cohen, M.S., Freeman, J.T., & Thompson, B.B. (1997). Training the naturalistic decision maker. In C.E. Zsombok & G. Klein. Naturalistic Decision making. Mahwah, NJ: Erlbaum.
- Cohen, M.S., Freeman, J., Wolf, S.P., Militello, L. (1995). Training metacognitive skills in naval combat decision making. Arlington, VA: Cognitive Technologies, Inc.
- Cohen, M.S., Thompson, B. T., Adelman, L., Bresnick, T. A., Tolcott, M. A., and Freeman, J. T. (1995). Rapid capturing of battlefield mental models. Arlington, VA: Cognitive Technologies, Inc.
- Cohen, M. S., Freeman, J. T., & Wolf, S. (1996). Meta-recognition in time stressed decision making: Recognizing, critiquing, and correcting. Human Factors, 38 (2), pp. 206-219.
- Cohen M. S., Parasuraman, R., Serfaty, D., & Andes, R.. (1997). Trust in Decision Aids: A Model and a Training Strategy. Arlington, VA: Cognitive Technologies, Inc.
- Cohen, M.S., Freeman, J.T., & Thompson, B.B. (1998). Critical thinking skills in tactical decision making: A model and a training method. In J. Canon-Bowers, & E. Salas (Eds.), Decision-making under stress: Implications for training & simulation. Washington, DC: American Psychological Association Publications.
- Cohen, M. S., Thompson, B. B., Adelman, L., Bresnick, T. A., Tolcott, M. A., and Freeman J. T. (1995). Rapid Capturing of Battlefield Mental Models. Technical Report 95-3. Arlington, VA: Cognitive Technologies, Inc.
- Doherty, M.E. (1993). A laboratory scientist's view of naturalistic decision making. In G. A. Klein, J. Orasanu, R. Calderwood, & C. E. Zsombok (Eds.), Decision making in action: Models and methods (pp. 51-99). Norwood, NJ: Ablex.
- Donaldson, Lex (1995). American anti-management theories of organization: A critique of paradigm proliferation. New York: The Cambridge University Press.
- Doyle, J. (1979). A truth maintenance system. Artificial Intelligence, 12(3), 231-162.

- Dreyfus, H. L. (1997). Intuitive, deliberative, and calculative models of expert performance. In C. E. Zsombok & G. Klein, (Eds.), Naturalistic decision making (pp. 17-28). Mahwah, NJ: Erlbaum.
- Ellis, Ralph D. (1995). Questioning consciousness. Philadelphia: John Benjamins Publishing Company.
- Ericsson, K. A., & Smith, J. (1991). Prospects And limits of the empirical study of expertise: an introduction. In K. A. Ericsson & J. Smith (Eds.), Toward a general theory of expertise. Cambridge: New York: University Press.
- Ericsson, K. A. The acquisition of expert performance; An introduction to some of the issues. In K. A. Ericsson (Ed.) The road to excellence: The acquisition of expert performance in the arts and sciences, sports and games. Mahwah, NJ: Erlbaum
- Freeman, J.T., and Cohen, M.S. (1995). Methods for training cognitive skills in battlefield situation assessment. Arlington, VA: Cognitive Technologies, Inc.,
- Fallesen, J. J., Marvin, F., and Bresnick, T. A. (1995). Training critical thinking skills for battlefield situation assessment: An experimental test. Arlington, VA: Cognitive Technologies, Inc.,
- Fischhoff, Baruch. Debiasing. In D. Kahneman, P. Slovic, & A. Tversky, Judgment under uncertainty: Heuristics and biases. Cambridge: Cambridge University Press.
- Forrest-Pressley, D. L., MacKinnon, G. E., & Waller, T. G. (Eds.) (1985). Metacognition, cognition, and human performance. NY: Academic Press.
- Glaser, Robert (1996). Changing the agency for learning: Acquiring expert performance. In K. A. Ericsson (Ed.), The road to excellence: The acquisition of expert performance in the arts and sciences, sports, and games. Mahwah, NJ: Lawrence Erlbaum Associates.
- Goodman, N. (1965). Fact, fiction, and forecast. Indianapolis: Bobbs-Merrill.
- Harmon, G. (1986). Change in view. Cambridge: The MIT Press.
- Helmreich, R.L., & Foushee, H. C. (1993). Why crew resource management? Empirical and theoretical bases of human factors training in aviation. In E.L. Wiener, R.L. Helmreich, & B.G. Kanki (Eds.), Cockpit resource management. NY: Academic Press, Inc.
- Heylighen, F. (Meta)Systems as constraints on variation: A classification and natural history of metasystem transitions.
- Holyoak, K. J. (1991). Symbolic connectionism: toward third-generation theories of expertise. In K. A. Ericsson & J. Smith (Eds.), Toward a general theory of expertise. Cambridge: New York: University Press.
- Hooker, Richard D., Jr. (1993). Maneuver warfare: An anthology. Novata, CA: Presidio Press.
- Janis, I.L. (1972). *Victims of groupthink*. Boston: Houghton Mifflin.
- Johnson, S.C. (1967). Hierarchical clustering schemes. Psychometrika, 32, 241-254.

- Kaempff, G. L., Klein, G., Thordsen, M. L., & Wolf, S. (1996). Decision making in complex command-and-control environments. Human Factors, 38 (2).
- Kerr, N.L. MacCoun, R.J. & Kramer, G. P. (1996). "When are N heads better (or worse) than one?": Biased judgment in individuals versus groups. In E. Witte & J.H. Davis, Understanding group behavior: Consensual action by small groups (Vol. 1). Mahwah, NJ: Lawrence Erlbaum Associates.
- Klein, G. A. (1993). A Recognition-Primed Decision (RPD) model of rapid decision making. In G. A. Klein, J. Orasanu, R. Calderwood, & C. E. Zsombok (Eds.), Decision making in action: Models and methods (pp. 138-147). Norwood, NJ: Ablex.
- Kleinman, D.L., & Serfaty, D. (1989). Team performance assessment in distributed decision making. In R. Gilson, J.P. Kincaid, & B. Goldiez (Eds.), Proceedings of the Interactive Networked Simulation for Training Conference. Orlando, FL: Naval Training Systems Center.
- Koslowski, B. (1996). Theory and evidence: The development of scientific reasoning. Cambridge: The MIT Press.
- Kuhn, D., Amsel, E., & O'Loughlin, M. (1988). The development of scientific thinking skills. San Diego: Academic Press, Inc.
- Kruskal, J.B. (1964). Nonmetric multidimensional scaling: A numerical method. Psychometrika, 29, 115-129.
- Larkin, J.H. (1981). Enriching formal knowledge: A model for learning to solve textbook physics problems. In J. R. Anderson (Ed.), Cognitive skills and their acquisition (pp. 311-344). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Larkin, J., McDermott, J., Simon, D. P., & Simon, H.A. (1980). Expert and novice performance in solving physics problems. Science, 20(208), 1335-1342.
- Leonhard, Robert. R. (1994). Fighting by minutes: Time and the art of war. Westport, CT: Praeger.
- Leonhard, Robert. R. (1991). The art of maneuver. Novata, CA: Presidio Press.
- Lind, William S. (1985). Maneuver warfare handbook. Boulder: Westview Press.
- March, J.G. (1996). Exploration and exploitation in organizational learning. In M. D. Cohen & L. S. Sproull (Eds.), Organizational learning (pp. 101-123). Thousand Oaks, CA: Sage Publications.
- McIntyre, R.M., & Salas, E. (1995). Measuring and managing for team performance: Lessons from complex environments. In R.A. Guzzo, E. Salas, & Associates (Eds.), Team effectiveness and decision making in organizations (pp. 9-45). San Francisco: Jossey-Bass Publishers.
- McKeithen, K.B., Reitman, J.S., Rueter, H.H., & Hirtle, S.C. (1981). Knowledge organization and skill differences in computer programmers. Cognitive Psychology, 13.
- Means, B., Salas, E., Crandall, B., & Jacobs, T.O. (1993). Training decision makers for the real world. In G.A. Klein, J. Orasanu, R. Calderwood, & C.E. Zsombok (Eds.),

- Decision making in action: Models and methods. Norwood, NJ: Ablex Publishing Corporation, 306-326.
- Metcalfe, J., & Shimamura, A. P. (1994). Metacognition. Cambridge, MA: The MIT Press.
- Nelson, Thomas O. (1992). Metacognition: Core Readings. Boston: Allyn and Bacon.
- (1993). Decision making in the cockpit. In E.L. Wiener, R.L. Helmreich, & B.G. Kanki (Eds.), Cockpit resource management (pp. 137-172). NY: Academic Press, Inc.
- Orasanu, J.M. & Salas, E. Team decision making in complex environments. In G. A. Klein, J. Orasanu, R. Calderwood, & C. E. Zsombok (Eds.), Decision making in action: Models and methods (pp. 327-345). Norwood, NJ: Ablex.
- Patel, V. L., & Groen, G.J. (1991). The general and specific nature of medical expertise: A critical look. In K. A. Ericsson & J. Smith (Eds.), Toward a general theory of expertise: Prospects and limits (pp. 93-125). Cambridge: Cambridge University Press.
- Pennington, N., & Hastie, R. (1993). A theory of explanation-based decision making. In G.A. Klein, J. Orasanu, R. Calderwood, & C. E. Zsombok (Eds.), Decision making in action: Models and methods (pp. 188-201). Norwood, NJ: Ablex.
- Ray, M., Y& Myers, R. (1986). Creativity in business. New York: Doubleday.
- Scott, W. Richard (1998). Organizations: Rational, natural, and open systems. Upper Saddle River, NJ: Prentice Hall.
- Schmitt, J.F. (1994). Mastering Tactics: A tactical decision games workbook. Quantico, VA: Marine Corps Association.
- Serfaty, D., MacMillan, J., Entin, E. E, & Entin, E. B. (1997). The decision making expertise of battle commanders. In C.E. Zsombok & G. Klein. Naturalistic Decision making. Mahwah, NJ: Erlbaum.
- Shafer, G. & Tversky, A. (1989). Languages and designs for probability judgment. In D. E. Bell, H. Raiffa & A. Tversky (Eds.), Decision Making: descriptive, Normative, and Prescriptive Interactions. Cambridge: Cambridge University Press.
- Shanteau, James. (1992). The Psychology of experts: An alternative view. In G. Wright & F. Bolger (Eds.), Expertise and decision support. New York: Plenum Press. The U.S. Marine Corps (1989). Warfighting. New York: Doubleday.
- Shastri, L., & Ajjanagadde, V. (1993). From simple associations to systematic reasoning: A connectionist representation of rules, variables, and dynamic bindings using temporal synchrony. Brain and Behavioral Sciences, 16, 417-494.
- Simon, H.A. (1962). The architecture of complexity. Proceedings of the Americal Philosophical Society, 106, 467-482.
- Smithson, M. (1989). Ignorance and Uncertainty: Emerging paradigms. New York: Springer-Verlag.
- Snizek, J. A., & Henry, R.A. (1990). Revision, weighting, and commitment in consensus group judgment. Organizational Behavior and Human Decision Processes, 45(1), 66-84.



- The U.S. Marine Corps (1989). *Warfighting*. New York: Doubleday.
- Thompson, B.T., Cohen, M.S., & Shastri, Lokendra (1997). A Hybrid Architecture for Metacognitive Learning (Hybrid Architectures for Complex Learning Program, Office of Naval Research Contract No. N00014-95-C-0182). Arlington, VA: Cognitive Technologies.
- Thompson, James D. (1967). Organizations in action. New York: McGraw-Hill.
- Toulmin, S. E. (1958). The uses of argument. Cambridge: Cambridge University Press.
- Turchin, V. (1977). The phenomenon of science: A cybernetic approach to human evolution. New York: Columbia University Press.
- Van Creveld, Martin (1985). Command in War. Cambridge: Harvard University Press.
- Voss, J.F., Wolfe, C.R., Lawrence, J. A., & Engle, R.A. (1991). From representation to decision: An analysis of problem solving in international relations. In R.J. Sternberg & P.A. Frensch (Eds.), Complex problem solving: Principles and mechanisms (pp. 119-158). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Watson, S. R., & Buede, D. N. (1987). Decision Synthesis. New York: Cambridge University Press.

## **APPENDIX A**

### **METHOD**

Seventeen active duty Army officers (rank of major or lieutenant colonel) at four different posts (Ft. Bragg, Ft. Riley, Ft. Carson, and Ft. Stewart) individually reviewed and critiqued prototype versions of the training system between March and September of 1998 in an effort to incorporate the opinions of senior-level personnel. Prior to working with the prototype, the officers were asked to solve the Arisle Scenario. This scenario was developed by Dr. Rex Michel of the Army Research Institute (ARI), and required the participants to recommend a course of action for regaining control of an island from an enemy force. The scenario and participant's recommendation was used as the basis for answering questions exercising critical thinking skills in the prototype system.

The sessions were tape-recorded. Time and resources permitted us to transcribe and analyze the sessions for nine participants. These participants were coded as follows:

- P#1 = Participant #3 from Ft. Riley (20 May 1998)
- P#2 = Participant #1 from Ft. Carson (7 July 1998)
- P#3 = Participant #2 from Ft. Carson (8 July 1998)
- P#4 = Participant #3 from Ft. Carson (9 July 1998)
- P#5 = Participant #1 from Ft. Stewart (8 September 1998)
- P#6 = Participant #2 from Ft. Stewart (9 September 1998)
- P#7 = Participant #4 from Ft. Stewart (11 September 1998)
- P#8 = Participant #4 from Ft. Bragg (26 March 1998)
- P#9 = Participant #5 from Ft. Bragg (27 March 1998)

All participants had completed their course work at CGSC, been on battalion and/or division staffs, and had combat experience and/or experience in a number of military training exercises. So, they clearly had the expertise to do the Arisle scenario and critique prototype versions of the training system.

The transcripts were analyzed to understand similarities and differences in how the nine participants (1) framed the Arisle scenario, in terms of what regaining control of the island meant, and (2) their recommended Course of Action (COA) for accomplishing the mission. In addition, the transcripts for the first seven participants were analyzed to identify similarities and differences in how they answered questions that the prototype system used to address critical thinking skills. (The two participants from Ft. Bragg were not included in the latter analysis because it was based on questions that were modified considerably after the Ft. Bragg interviews.) These analyses are presented in the Results section of this report.

The remainder of this Method section is divided into two parts. The first part describes the Arisle scenario in some detail in order to help the reader understand the participants' responses. The complete package of scenario materials is presented at the end of this report. The second part describes how the research team analyzed the transcript data. Each part is described, in turn.

### **Arisle Scenario**

The scenario begins with participants being told that they are the new G-3 of the 105<sup>th</sup> Air Assault Division, and it's the morning of 22 March. The Division is engaging in OPERATION POST HASTE in support of the island of Arisle, which has been invaded by forces from the neighboring island of Mainlandia. The United States (US) was caught somewhat off-guard by the invasion, and contingency planning had not been completed for such an event.

The participants are given a briefing package containing the following information:

- (1) The Road to War: a summary of the events that led up to the present situation.
- (2) Mission Description – OPERATION POST HASTE: Summary of the execution order from the JCS to the Commander of the operation, Vice Admiral Coaler.
- (3) Intelligence: A G-2 summary of the situation as of 0630 this morning.
- (4) Status of Forces: G1/G4 summary of the friendly forces and equipment available.
- (5) Commander's Estimate of the Situation (partially complete)
- (6) Description of Arisle: A G-2 report covering topography, hydrography, vegetation, climate, infrastructure, demography, government, and economy.

In addition, participants had access to a large wall map of Arisle containing available information about the disposition and composition of enemy forces, including hostage sites. The complete package of scenario information is presented at the end of this report. A schematic of Arisle is presented on the next page.

The participant's task was, as the Division G-3, to complete the estimate of the situation by developing and wargaming course(s) of action (COAs) for the invasion of Arisle by the ground forces. In particular, the Division Commander expects a recommended COA as well as justification for it.

Selected sections from the Mission Description, Intelligence, Status of Forces, and Commander's Estimate of the Situation are presented below to provide readers with necessary background information to understand the participants' COAs.

### **Mission Description**

Just prior to 0930 22 March, the following Execution Order was passed from the CJCS to the Commander, Operation Post Haste, Vice Admiral Coaler:

The President of the United States directs that you proceed with all reasonable Haste to retake the island of Arisle from the Mainlandia forces now in control of the island. It is vital to the interest of the United States and its allies that the freedom of Arisle be restored before the government of Mainlandia can gain sufficient international backing to make the restoration of full independence probable.

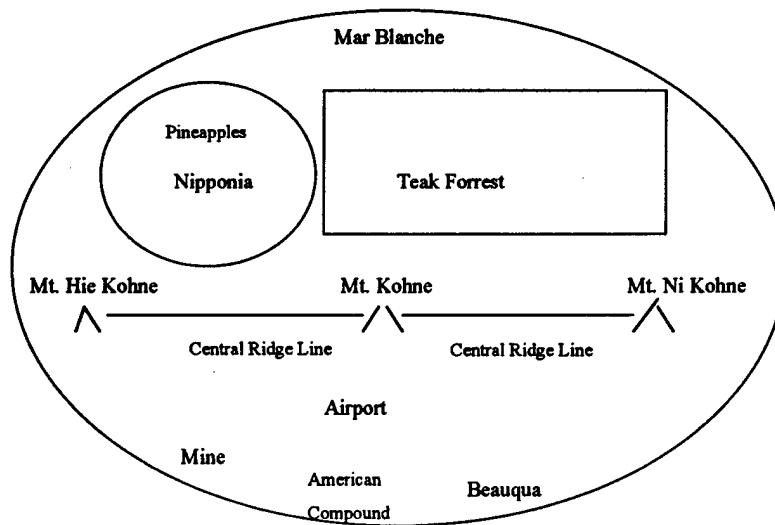


Figure 27. Schematic of Arisle

You are authorized to use all reasonable force to restore Arisle with the following exceptions: You may not enter territorial waters of Mainlandia nor fire upon any vessel, aircraft or other object that is within Mainlandia's territorial limits. You may not enter the territorial waters surrounding the Westernia island of Ebon nor fire upon any object within those territorial waters. You may not use any destructive nuclear, chemical, or biological device in this operation under any circumstances without my direct approval. You are to take all reasonable precaution to preclude the loss of non-combatant civilian lives. It is imperative that your government not be accused before the international community of placing any other interests before those of humanitarian concern."

Vice Admiral Coaler then said that the CJCS had also ordered that **the island be under US forces control by 2400 25 March** (bold for emphasis here). The CJCS had further stated that it is unlikely that any significant additional combat elements could be brought to bear within this timeframe—we will have to work with the forces available.

### Intelligence

All Mainlandia Army forces on the island are under the command of BG Esau Schattu, commander of the First Mainlandia Paratroop Regiment. The regiment is Mainlandia's premier direct combat force and has considerable combat experience fighting insurgents.

Not all of the First Mainlandia Paratroop Regiment reached Arisle before our Navy blockaded the island. It appears that the two paratroop battalions from the regiment and the eight BM-21V 12-rd 122mm rocket launchers from the regiment's combined artillery battalion are totally on the island. Only one company of its BMD-1 equipped airborne battalion made it.

Major weapon system numbers estimated to be on the island now include:

AIRCRAFT	ARMOR	ANTI-TANK	ARTILLERY	AIR DEFENSE
5 MiG-17 A/C 6 HIND-D AH	8 BMD-1 10 ASU-85	9 BRDM Lnchrs 12 Manpack AT-4 6 SPG-9	18 130mm FG 8 MRL(12rds) 6 120mm Mort	9 SA-11 10 SA-13 50 SA-14

It is estimated that between 2200 and 2500 uniformed Mainlandia troops are on Arisle. Of these, about one-half are probably combat troops. In addition, there are between 150 and 200 Mainlandia paramilitary terrorists known as Noclas. These terrorists appear to hold all of the foreign national captives on the island. There is reliable intelligence that the Noclas are not under the command of BG Schattu; they are reporting directly to the Mainlandia Department of International Relations. Also, some 100 Mainlandia citizens who were living on Arisle have been armed and are acting as a police force to control the citizens. They are operating under control of the Noclas and probably include Noclas agents.

The enemy has dug in weapon positions along the entire length of the central ridge of Arisle, as well as two of the three batteries of 130mm field guns. There are one or two alternate positions prepared for each of these weapons currently on the ridge and reconnaissance indicates that they are making frequent moves. Direct observation and fields of fire for weapons along the ridge are generally excellent across the entire island except toward the NE quadrant where the teak forest obscures about one-half the shoreline from the ridge.

The remaining battery of 130mm is in the village of Nippoinia in the NW quadrant of the island. The SA-13 SAMs are dispersed around the perimeter of the island in pairs. The five remaining MiG-17s are on the runway of the airfield in the SW quadrant. Currently, the six HIND-D assault helicopters are in camouflaged positions at the base of the central peak in the NW quadrant.

The two battalions of paratroopers are spread around the perimeter of the island, apparently patrolling the defending the shoreline. One battalion's sector is south of the ridge and the other north. Each battalion is supported by BMDs, ASU-85s, 120mm mortars, and BRDM ATGM Launchers. Although not confirmed, it appears that the third paratroop company is with the six HIND-Ds in the woods. If this is so, it is most likely that this is an air-mobile, quick reaction force for the entire regiment. Force headquarters is in the downtown section of the port city of Beauqua in the SE quadrant.

We believe we have now identified the location of all 144 foreign nationals believed held by the Noclas. They are being held in groups of six to eight at locations as indicated by the green "Xs" on the sitmap. These are all positions important to the Mainlandia retention of the island. Each group is being held in the open, usually with a small tent for shelter, by four or five Noclas and are moved small distances at erratic times throughout the day and night. The Noclas have made no attempt to hide these locations.

There is no way that Mainlandia could have hoped to hold out for long against superior air, naval, and ground forces which the US could quickly buildup in the area. It is believed that their intent all along was to use the hostages to avert any large-scale counterattack until they could convince the other FOCOP nations to intervene economically, or even militarily, on their behalf. Other diplomatic actions being taken make it apparent that they are attempting to get other nations to support their claim that Arisle was formerly (and still) part of Mainlandia.

Their well-planned diplomatic offensive is apparently meeting with more success than we thought possible. Intelligence sources within FOCOP claim that the organization will most likely take actions to support Mainlandia within the next two days. Military intervention has been discussed, but strong economic pressure on the US and its allies is a certain step and most sources agree that it would meet with sufficient success to force the US into a compromise.

Given these likely actions, the most probable intent of Mainlandia is to keep the US from gaining control of Arisle until a diplomatic success is assured. Their best bet for doing this is the threat of the lost of the hostages and of high US casualties in retaking Arisle.

The enemy's main strength is the location of the hostages. It is impossible to attack their air defense or artillery positions, the airfield, port facility, or water and power sources by indirect fire without almost certain hostage casualties. The fanaticism of the Noclas works to their advantage in this situation as well as the fact that the military command on Arisle does not control them. It is almost certain that the Noclas would kill the hostages even if the military capitulated. The positioning of artillery along the central ridge offers excellent observation out to sea and along most of the shoreline as well as most the interior landmass of the island.

The small Mainlandia force on Arisle is their greatest vulnerability. The small combat force is stretched over the circumference of the island and it should be relatively easy to inhibit reinforcement of any section of the island through air power and indirect fire.

Their command and control also appears vulnerable. Communication is by FM radio only supported by three relay stations along the ridge. There is no naval support now available and air support for the forces on the island is inadequate to the task. No logistical resupply is possible; they are completely cut off from Mainlandia. Lastly, the great majority of the population does not support a Mainlandia take over.

#### **Status of US Forces (Partial List)**

3Bde, 105 AASIT Div(-)  
HHC, 3/105  
1-604 AASLT Battalion  
2-604 AASLT Battalion  
3-206 FA Battalion, 105(T) (DS)

4Bde, 105 AASLT Div(-)  
HHC, 4/105(-)  
105 Cmd Avn Bn(-)

#### **ATTACHMENTS**

1-454 Ranger Infantry Battalion  
HHC  
A/1-454  
B/1-454  
C/1-454

Marine Expeditionary Unit (MEU)  
1-44 Battalion Landing Team  
5-104 Marine Helo Squadron(-)

717 Asslt Hel Bn (UH-60)  
 908 Med Lift Hel Bn(-) (CH-47)  
 1-644 Atk Hel Bn (AH-1S)  
 2-644 Atk Hel Bn (AH-1S)  
 105 Air Recon Sqdn(-) (AH-1S)

## MEU Service Support Group

Status of major weapons and equipment organic to the 105<sup>th</sup> (OH/Msn Cap):

AH-1S	OH-58s	UH-60	CH-47	105HOW	60MM	81MM	TOW	Dragon
50/46	38/36	50/45	16/15	18/17	18/15	8/8	40/40	45/40

Vulcan Crews	Stinger	Personnel Asgnd/PFD
9/7	26/26	5070/4968

All available combat elements of the 105<sup>th</sup> are now on Dodian, about 200 miles from Arisle. The entire available force from the 105<sup>th</sup> is expected to be on Dodian by 2100 this evening, 22 March.

The MEU is fully equipped and self contained with helicopters, light armored wheeled vehicles, landing vehicles, seven 81MM, eight TOW, and 1,831 PFD. The MEU is anchored off Dodian Island about Naval Amphibious Group vessels ready to move on two hours notice.

The Ranger Battalion has six 60MM, nine Dragon, and 597 PFD. It is on Madsritasia Island with sufficient Air Force MC-130 aircraft support to transport its combat elements on night drop into Arisle.

The Special Operations Forces (SOF) are under the control of the USSOC commander, not the ground component commander. These forces consist of one Navy SEAL platoon with 40 men currently on Arisle providing surveillance and intelligence, and one Army Delta Force company with 78 troops on Madsritasia. There are sufficient Army/Air Force SOF aircraft to insert the Delta Force into Arisle.

A fully equipped naval battle group is currently deployed around Arisle, and a large USAF air base is on the island of Madsritasia.

### Commander's Estimate of the Situation (Partial)

**Own Situation:** Recent and present significant activities – A 40 person Navy SEAL platoon is currently on Arisle providing surveillance and intelligence information; they have located all hostages and have been tasked with freeing them prior to H-Hour.

**Own Situation:** Peculiarities and weaknesses – This will be a “come as you are” fight; we must accomplish the mission with what we have before diplomatic efforts from FOCOP cause a cease fire with Mainlandia in possession of Arisle. Our initial wave of planes will be vulnerable to enemy air defense until we have taken out all of the air defense locations. Our biggest challenge may be trying to do our mission without having civilian hostages killed.

**Relative Combat Power** – We have overwhelming combat power to include global air superiority. However, the enemy has sufficient force to delay us briefly – and that may be enough for him to achieve his diplomatic goals.

**Enemy Capabilities** – The enemy has no capability to attack our forces or to defend Arisle for extended periods of time (more than a few days). He does have the capability to delay our assault by making it difficult to attack the beaches, and by getting as many “quick kills” with his air defense systems as he can. He has the capability, through the Noclas, to keep hostages moving around frequently and to keep them at targets that we are likely to attack.

The most probable enemy course of action is to use the hostages to avert any large scale counterattack until they can convince the other FOCOP nations to intervene economically, or even militarily on their behalf. The State Department believes that their likely intent all along has been to use the hostages to avert any large-scale counterattack. Our original guidance from the Secretary of Defense indicated that diplomatic efforts would be a slow process and a deadline of 2400 25 March would provide adequate time for a military response to locate and secure the freedom of the hostages and then retake the island. Unfortunately, their diplomatic offensive is meeting with more success than thought possible.

As ordered, the Division’s mission is to ensure that Arisle is under US forces control by 2400 25<sup>th</sup> March. H-Hour is 0300 24 March; consequently, there are 45 hours to complete the mission

#### **Data Analysis Plan**

The transcript data was analyzed in three steps. These steps are described here in the same way that the results are presented in the next section of this report.

**Step 1: Document each participant’s recommended Course of Action (COA) for solving the Arisle scenario.** Each participant’s COA was described in terms of a common set of factors and represented in a tabular format to facilitate a comparison of their similarities and differences. The following factors were used to describe the participants’ recommended COA:

- (1) General Intent (Preferred COA)
- (2) COA Summary
- (3) Air Force’s Mission
- (4) Ranger’s Mission
- (5) 1<sup>st</sup> Air Assault BN’s (1-604<sup>th</sup>) Mission
- (6) 2<sup>nd</sup> Air Assault BN’s (2-604<sup>th</sup>) Mission
- (7) Marine Expeditionary Unit’s (MEU) Mission
- (8) Delta Team’s Mission
- (9) Attack Helicopters’ Mission
- (10) AC-130s Mission
- (11) Role of Naval Gunfire
- (12) How the Hostage Situation Was Handled
- (13) How Psychological Operations (PSYOPS) Were Used



- (14) Number of COAs Generated
- (15) Which COA Was Preferred
- (16) How It Was Different From the Less Preferred COA, and the
- (17) Reasons for the Preferred COA

**Step 2: Document how each participant answered the questions for each component of the prototype training system.** The questions for each component are listed below.

- (1) Question about Action Orientation
  - (a) Proactive actions in your COA?
  - (b) Predictive actions in your COA?
  - (c) Reactive actions in your COA?
- (2) Questions about Stories
  - (a) Reasons for your COA?
  - (b) Reasons against your COA?
  - (c) Situation features that had the biggest effect on your COA?
  - (d) Goals in this situation?
  - (e) Does your story show how the different events are connected toward accomplishing your goal?
  - (f) Do you have a friendly intent story?
  - (g) Do you have an enemy intent story?
  - (h) Do you have a mission analysis story?
  - (i) Friendly and enemy intent?
  - (j) Correlation of forces?
  - (k) Rate of movement?
  - (l) Principles of war?
  - (m) Action execution?
  - (n) Evidence interpretation?
  - (o) Other stories?
- (3) Questions about Identifying Gaps
  - (a) What events did/would you want to know more about?
  - (b) Where these events included in your story? If "yes," how were they included? If "no," how would you include them in your story?
  - (c) Why is the gap important?
  - (d) How would you fill the gap?
- (4) Questions about Deconfliction
  - (a) Examples of conflicting information?
  - (b) How resolved conflict in information
  - (c) Did the participant mention the conflict about the enemy's ADA?
  - (d) Examples of conflicting goals?

- (e) How resolved conflict in goals?
- (f) Did the participant mention the conflict between trying to quickly control the island and safely freeing all the hostages?
- (5) Questions about Evaluate
  - (a) Key assumptions?
  - (b) Were these assumptions important?
  - (c) Were these assumptions reliable?
  - (d) Two different stories?
- (6) Questions about Act
  - (a) What actions would you take to fill in your gaps?
  - (b) Were these actions included in your COA?
  - (c) Did you take actions to reduce your uncertainty?
- (7) Questions about Stop
  - (a) How much time would you take if this were a real situation?
  - (b) Costs of delay?
  - (c) Unresolved uncertainties when you begin the mission?
  - (d) Possible to resolve these uncertainties?
  - (e) Potential costs of not resolving these uncertainties?
  - (f) Which of these uncertainties could be resolved if you took more time?
  - (g) Costs of delays versus costs of errors?
- (8) Questions about the Devil's Advocate/Crystal Ball technique.

**Step 3: Identify the similarities and differences in how participants solved the Arisle scenario and answered the questions listed in Step 2 above.** The comparison was accomplished by using the documented results of the first two analyses (i.e., Steps 1 and 2). In addition, the actual transcripts were consulted where necessary. Although some subjective interpretation was required, the research team relied on the participants' actual statements and answers to questions as much as possible. Statistical tests were used in a few cases where they were appropriate.

The Step 3 analysis is summarized in the following four sections presented in the Results:

- (1) Similarities and differences in (a) how participants framed the Arisle scenario and the COAs they developed to solve it;
- (2) Similarities and differences in the participants' Action Orientation;
- (3) Similarities and differences in the participants' answers to question asked in the prototype's Story module and each of the IDEAS modules; and
- (4) A more detailed examination of how three of the participants solved the Arisle scenario, with a particular focus on how the situation features and goals were interconnected in the recommended COA.

## RESULTS

### STEP #1: THE PARTICIPANTS' RECOMMENDED COA FOR THE ARISLE SCENARIO

#### PARTICIPANT CODING

- P#1 = Participant #3 from Ft. Riley (May 1998)  
P#2 = Participant #1 from Ft. Carson (July 1998)  
P#3 = Participant #2 from Ft. Carson (July 1998)  
P#4 = Participant #3 from Ft. Carson (July 1998)  
P#5 = Participant #1 from Ft. Stewart (September 1998)  
P#6 = Participant #2 from Ft. Stewart (September 1998)  
P#7 = Participant #4 from Ft. Stewart (September 1998)  
P#8 = Participant #4 from Ft. Bragg (March 1998)  
P#9 = Participant #5 from Ft. Bragg (March 1998)

Category	P#1	P#2	P#3
General Intent (Preferred COA)	The American center of gravity is not just the mine, but the whole perspective of how could Mainlandia have the audacity to do this. Given that, we want to take the entire island with as little collateral damage as possible.	(1) Eliminate the enemy's offensive capability, particularly his fire support along the ridgeline and (2) control the southern portion of the island (American Compound, Capital City, airport, and Oregonium mine)	Quickly insert and mass forces to surprise enemy and gain control of the southern portion of island as quickly as possible. Once south is controlled, including commo., it's just a matter of time before they surrender.
COA Summary	Set conditions. Then simultaneously both assault BNs land in north and MEU in south, and move toward each other to destroy enemy. Rangers initially a reserve; then they clear enemy in forest	Set conditions. Then simultaneously Rangers and assault BNs seize the 3 mountains and, once enemy fire support eliminated, the MEU lands in south to control southern portion of island.	Set conditions. Then simultaneously, Rangers seize airport and MEU lands in south. Then assault BNs land at airport and proceed to secure southern portion of island.
Air Force's Mission	First, use air to destroy enemy ARTY (and ADA?)	Take out Migs at airport and ADA and ARTY along	Before troops land, take out C2 so enemy can't

	on 3 mountains and ridgeline	ridgeline ("high ground")	communicate, and ADA and ARTY sites that can affect Rangers and MEU
<b>Rangers' Mission</b>	Used as reserve. After completion of 3 simultaneous attacks, the Rangers clear enemy forces in the teak forest	Air drop on central mount. to eliminate enemy reserve and secure high ground to eliminate enemy fire support. "Be prepared mission." Help free hostages.	Simultaneously with MEU, Rangers seize control of airport..
<b>1<sup>st</sup> Air Assault BN (1-604<sup>th</sup>)</b>	Feints landing north of Mar Blanche. Then, supported by attack helo, lands east of Mar Blanche to destroy 2 enemy platoons and seal- off city. Follow-on mission: Air assault to central mountain to control it.	Simultaneously, parachutes in to take western mountain to take high ground and eliminate enemy fire support. (Supported by naval gunfire.)	Once the airport is secure, both air assault battalions land at airport (one at a time) and proceed to retake the capital city (Beauqua) and eliminate enemy communications capabilities.
<b>2<sup>nd</sup> Air Assault BN (2-604<sup>th</sup>)</b>	Simultaneously, and supported by attack helo, the 2 <sup>nd</sup> BN lands and secures Nipponia (pineapple plantation). Follow- on mission: Drive down road to take airfield and Amer. Compound, and clear Beauqua (capital) of enemy.	Simultaneously with Rangers and 1 <sup>st</sup> BN, the 2 <sup>nd</sup> BN takes the eastern mountain to secure high ground. (Would be an air assault since 1-604 <sup>th</sup> is parachuting in.)	(Same as above)
<b>Marine Exp. Unit (MEU)</b>	Simultaneously with the two air assault battalions' attacks, MEU lands at beach south of Oregonium Mine and proceeds to take the mine and western mountain.	Once the enemy's fire support is eliminated or suppressed along the high ground in the center and west, the MEU comes ashore at the small beach around American	Lands at beach in front of Oregonium mine to control mine. Then, links up with Rangers and air assault battalions to secure southern half of island. (Note: Did not provide more details; for example,

		Compound to secure it and the capital.	with respect to taking mountains.)
Delta Team?	Not mentioned	Not mentioned	Not mentioned.
Attack Helicopters	Support both air assault battalions	The 1-644 Attack Helicopter BN would support Rangers' drop on central mountain. 2-644 Attack Hel. BN would attack enemy field ARTY in the pineapple plantation	Initially supports Rangers' seizure of airport. Then, supports air assault battalions' seizure of capital.
AC-130s	Although not mentioned, we're assuming they're part of the Air Force group clearing ARTY off ridgeline.	Although not mentioned, we're assuming they're part of the Air Force group clearing ARTY off ridgeline.	Their mission is to destroy the HINDs so that the enemy's mobile (air assault) reserve couldn't move quickly.
Naval Gunfire	Not mentioned	Supporting the 1-604 <sup>th</sup> air assault BN in taking the western mountain.	Support Rangers and help destroy the enemy's counter-battery field ARTY
How Handled Hostage Situation	Assumes SEALs will free them, although does have Rangers as a reserve	The Rangers have an explicit "be prepared" mission in case SEALs can't free all the hostages	SEALs free hostages in Amer. Compound and capital before MEU and Rangers land. Thinks SEALs don't have enough assets to free hostages in north. After securing southern half of island, would begin negotiating with NOCLAS to free hostages. If that failed, he'd send out special teams to free them.
Use of PSYOPS?	Never mentioned	Yes, focusing on enemy troops	Not mentioned by name, but assuming they're part of the negotiation effort to

			free the hostages.
# COAs Generated	2	2  (Note: Almost generated 3, but dismissed a COA with a landing in the north because all the vital assets are in the south.)	1  (Note: Changed his COA as he was developing it. Originally had Rangers going after the enemy's mobile reserve in the teak forest and the air assault battalion taking the airport. However, he decided that he didn't have enough assets to do this.)
Which COA Preferred	Second	Second	N/A
How Different From Less Preferred COA	Preferred COA has simultaneous attacks. Less preferred COA only focuses on southern part of island. MEU lands and seizes mine and western mountain. 1 <sup>st</sup> BN takes Amer. Comp. & central mountain. 2 <sup>nd</sup> BN takes eastern mtn. Rangers retake capital city.	Instead of sending the 2-604 <sup>th</sup> Air Assault BN to take the eastern mountain, he had them securing the airport and acting like a reserve. Decided that airport was not critical because we could already support the attack. Also, initially had the 2-644 (instead of naval gunfire) supporting the 1-604 <sup>th</sup> take western mountain.	N/A
Reasons for Preferred COA	Destroys more enemy forces; Has better combat ratios; Minimizes collateral damage because we	COA#2 looks more like a Just Cause takedown where you're doing everything at once. Willing to give up the reserve to hit	N/A

	<p>don't first jump into cities;</p> <p>Doesn't start with securing the mine, so less likely to be seen as focusing on self interests;</p> <p>Provides less threat to our own troops;</p> <p>Has Rangers as a reserve; and</p> <p>COA#2 is more consistent with how P1 framed the problem.</p>	<p>everything at once. This gains surprise and overwhelms the enemy's ability to react.</p>	
--	--	---	--

Category	P#4	P#5	P#6
General Intent (Preferred COA)	<p>Destroy the enemy's strength, which is his ARTY, and seize the political center of gravity, which is the capital and airport. (Control the southern half of island, including key terrain in center, Mt. Kohne, with minimal casualties.) "I get that, and the SEALs get the hostages, then the enemy is not going to be successful."</p>	<p>First center of gravity, and most important goal, is to control island within 48 hours. Control is defined as seizing urban centers in the north and south, the airport, American Comp., capital, port, &amp; mine. (After that, can mop up enemy troops.) Second center of gravity is the media. So, the next goal is freeing the hostages.</p>	<p>Wants to secure the southern part of the island to show that America is intent on securing Arisle, and to remove the enemy's legitimacy for being there. And, then, he'll proceed from there. So, his objective is to get a foothold on the island, and then eliminate the enemy force systematically. (The enemy is not the objective.)</p>
COA Summary	<p>Set conditions. Then Rangers destroy ARTY on central ridge and both assault BNs seize central mountain. Then MEU lands in south to seize Amer.</p>	<p>Set conditions. Then 1 assault BN seizes airport while other secures compound, capital, mine, and port. MEU seizes Mar Blanche in north. Rangers</p>	<p>Set conditions. Then Rangers and MEU land in south to secure capital and adjacent area. One assault BN seizes western mountain and the other BN</p>

	Compound, capital, and airport.	initially a reserve to free hostages; then they clear enemy from ridge & forest.	seizes the airport and, then the central mountain.
Air Force's Mission	Prepare battlefield. Electronic attack using Prowlers against SA-11s, and Air Force attacks against SA-13s and ARTY in the center of island to create an air corridor.	Takes out the ADA.	Doesn't see one. "You're not going to get a lot of air force help with active air defense. I don't see any air force action in the south. ... I don't want to screw up the airfield by having them bomb [it or have them] destroy ... the Amer. Comp.
Rangers' Mission	Air assault to destroy the 3 ARTY batteries on center ridge near Mt. Kohne. This will prevent indirect fire on MEU. If enemy's mobile reserve is not moving east, Rangers will handle them. (Movement would be because of MEU's deception).	Initially during Phase 1, as a reserve to help rescue hostages. Later during Phase 2, to clear enemy troops off the ridgeline and out of the teak forest.	Will come in first (with the MEU) to defeat enemy units in the capital, and disrupt C2 from the enemy's BN HQs. (Note: He never said how the Rangers got there. Did they air drop or come ashore with the MEU?)
1 <sup>st</sup> Air Assault BN (1-604 <sup>th</sup> )	Both BNs' first task is to seize central mountain, which is the key terrain on the island. The second task is to destroy the MLRS batteries and fix the enemy infantry there so that they can't counterattack successfully. (Note: Later, would be used to take western & eastern mountains	Supported by attack helicopters (Apaches), 1-604 <sup>th</sup> seizes and controls the airport and the major road intersection north of Beauqua, the capital.	Very confusing because he refers to a Brigade (-) twice. However, I think he's first using one of his air assault battalions to secure the western mountain after the Rangers and MEU have secured the capital and adjacent area.



	if PSYOPS doesn't get enemy troops there to surrender.)		
2 <sup>nd</sup> Air Assault BN (2-604 <sup>th</sup> )	See above for 1-604 <sup>th</sup> .	Secures the southern portion of the island, including the capital, American Compound, Oregonium mine and port facility. (Note: Did not say if 2-604 <sup>th</sup> air-assaulted simultaneously with the 1-604 <sup>th</sup> taking airport or if came in after 1-604 <sup>th</sup> through airport.)	Then, he'll use a Brigade (-) or the second air assault battalion to secure the airfield after the enemy's ADA has been destroyed and the Rangers and MEU have secured the capital and the adjacent area. The Brigade (-)'s follow on mission is to secure the central mountain and the road north to stop reinforcements coming south.
Marine Exp. Unit (MEU)	First, create a deception by MEU helicopters circling near eastern mount. (Deception to draw enemy's mobile reserve eastward.) Then, as soon as air assault battalions take out MLRS batteries, MEU lands at beach near American Comp. & proceeds to seize the compound, capital, & airport. MEU also destroys enemy BN HQs to destroy C2.	MEU will seize Mar Blanche, which is the urban center in the north, and the beach, bridge, and road network over the river running north to south on the island.	Comes in with the Rangers to seize capital and adjacent area. (Note: Doesn't say where the MEU lands.)  MEU's organic assets (attack helo and fixed-wing?) destroy enemy ADA around the airport and capital.  MEU's secondary task may be to help free hostages.
Delta Team?	Not mentioned	Come in early (before air assault?) to secure mine and free hostages in Amer. Compound	Not mentioned.

Attack Helicopters	Acts as a reserve to block the enemy's mechanized threat (in north) from counterattacking.	First, one squadron goes after ADA and the second takes out the enemy ARTY along the ridgeline so that they can't fire down on Amer. troops. Then, supports 1-604 <sup>th</sup> BN in seizing airport.	Mentions early in session that rotary and fixed wing aircraft would suppress enemy air defense, but doesn't consider again.
AC-130s	Although not mentioned, assuming they're part of the Air Force group clearing ARTY off ridgeline.	Although not mentioned, assuming they're part of the Air Force group	Not mentioned.
Naval Gunfire	Firing at enemy positions near eastern mountain as part of the MEU deception	Support MEU in north will "battle op" throughout the region, particularly ADA suppression along ridgeline and at the port facility.	To eliminate enemy ADA and ARTY in the south.
How Handled Hostage Situation	Assumed that SEALs would free hostages. Has no contingency plan.	Delta Team frees hostages in American Compound and adjacent areas. SEALs free as many other hostages as possible. Rangers are in reserve.	Assumes SEALs can free hostages in south, perhaps with help of MEU. "If we secure the southern portion of the island, and then they begin killing hostages in the north, then that's a bitch. Okay. But that's the way it's going to go." (He noted that the COA "basically disregarded the hostages.")
Use of PSYOPS?	Yes. Try to get enemy on western & eastern mountains to surrender. If they don't, use air assault	Yes. Communicate through enemy's C2 to influence some of the NOCLAS to not	Not mentioned

	battalions to take them after ARTY and air force prep.	harm the hostages.	
# COAs Generated	<p>1</p> <p>(Note 1: Only other type of COA he could think of was "going around the periphery of the island," which he thought would take too long. Therefore, he didn't want to consider it.</p> <p>Note 2: During training, he created a contingency plan for destroying ARTY on ridgeline. Specifically, he'd use Apaches and give the air assault brigade a "be prepared mission.")</p>	1	<p>1</p> <p>(Note: Starts and then stops sketching a COA whose main effort is to free the hostages. This COA is "if we think the hostages are the most important thing in this operation." He'd have to talk with Higher HQs to learn their intent because the write-up says not to jeopardize or compromise the mission because of the hostages.)</p>
Which COA Preferred	N/A	N/A	N/A
How Different From Less Preferred COA	N/A	N/A	N/A
Reasons for Preferred COA	N/A	N/A	N/A

Category	P#7	P#8	P#9
General Intent (Preferred COA)	Destroy the enemy and regain control of the entire island as quickly as possible. This intent included minimizing casualties and ensuring the safety of the hostages.	To seize Arisle by deadline and to secure hostages where possible (within mission parameters)	Seize Arisle no later than 2403 March to deny Mainlandian forces opportunity to gain international backing. ("Seize" means control of island & destruction of enemy force, or their withdrawal or surrender.)
COA Summary	Set conditions. Then simultaneously, Rangers seize airport, MEU lands in south to secure southwest part of island, & 1 assault BN seizes beach at Mar Blanche. Then, Rangers seize pineapple plantat., 2 <sup>nd</sup> BN secures capital and links up with MEU to secure south, as 1 <sup>st</sup> BN moves down toward eastern mountain.	Set conditions. Then simultaneously, Rangers seize airport and MEU lands in south to seize mine and destroy enemy. Then they proceed to take capital and secure southern part of island. One BN secures Mar Blanche and the other seizes pineapple plantat.	Set conditions. Then both assault BNs secure Mar Blanche and proceed to destroy enemy in zone. On order, Rangers seize airport and proceed (on order) to secure capital, while MEU lands on far southwestern beach to destroy enemy force in zone moving west to east.
Air Force's Mission	Hit targets in all 3 engagement areas before, during, and after H-Hour. EF-111s jam enemy's HF radios to disrupt their C2. Naval aircraft help clear SA-13 sites in the south and north. FA-16s and F-4Es provide Close Air Patrol to protect helicopters. Would not use B-52s; their bombs may cause	Suppress enemy ADA and jam enemy C2 before our attack helicopters launch their attacks against enemy ARTY along ridgeline. Air force also will attack ARTY using precision weapons, and will join helo in attacking BN Headquarters near capital.	Jam and destroy enemy ADA, ARTY, and C2. (Set conditions for airborne operations and beach landing.)

	collateral damage.		
Rangers' Mission	Simultaneously with landings by MEU at southwestern beach and first air assault BN at Mar Blanche beach, the Rangers seize the airport using an airfield clearing technique. Their follow-on mission would be to seize the pineapple plantation and clear that sector to the northwest.	After air force and helo destroys most of enemy ARTY & disrupts their C2, the Rangers would seize the airport simultaneously with the MEU's landing in south. After securing airport, the Rangers would be prepared to take the BN HQ and capital.	On order, Ranger BN attacks to seize airport. This is the initial main effort. Its purpose is to allow forces to build up. Rangers' second task is, on order, to secure capital. He wants to control what goes into and out of it. [Wants capital secured in 2 hours so by 5 AM it's surrounded by good guys.]
1 <sup>st</sup> Air Assault BN (1-604 <sup>th</sup> )	First BN would air assault to seize the beachhead at Mar Blanche (northern city). They would clear in sector to destroy the enemy on the eastern side of the island.	One of the air assault battalions lands at beach northeast of Mar Blanche to gain control of the highway and destroy enemy in northeast	Both air assault BNs attack first. They secure Mar Blanche to control access to it. Then, they search and attack in zone to destroy enemy force in north. They're a supporting effort; their purpose is to protect the northern flank of the main effort in the south.
2 <sup>nd</sup> Air Assault BN (2-604 <sup>th</sup> )	Air land at airport with responsibility for the sector east of the Marines and west of their sister BN. Their initial mission would be to relieve the Rangers at the airport, secure the capital, and then clear that sector.	The second BN lands in north too to take Nipponia (pineapple plantat.) and isolate it.	(See above)
Marine Exp. Unit	MEU lands at southern beach and attacks in sector destroying enemy in	As Rangers seize airport, the MEU lands at beach below mine to seize	On order, MEU will conduct amphibious assault on far southwestern beach

	southwest sector of island, including western mountain.	the mine and destroy enemy force in zone. MEU also prevents enemy from returning to this objective.	to destroy enemy forces in zone. It's the main effort moving west to east. [Near simultaneity of three operations.]
Delta Team?	Would have them help the SEALs because there are not enough SEALs to free all the hostage sites.	Not mentioned.	Not mentioned.
Attack Helicopters	Along with air force, the first attack BN hits "parked targets" (ARTY and ADA?) on western and central ridgeline and the 2 <sup>nd</sup> attack BN hits targets on eastern ridge and in pineapple plant.	Attack enemy ARTY on ridgeline & BN Headquarters near capital.	Support assault BNs securing Mar Blanche. Then, goes after enemy's armor assets once they start moving south.
AC-130s	Initial priority would be supporting the Rangers' seizure of the airport. After that, the AC-130s will support the first air assault BN in north.	Not mentioned.	Although not mentioned, I'm assuming they're part of the Air Force group
Naval Gunfire	Not mentioned	Not mentioned.	First supporting Air Force and air assault BNs in north. Then (or simultaneously?) supporting MEU in southwest.
How Handled Hostage Situation	Pointed out that he'd know more about the SOC plan because he'd have a Special Forces liaison team. But for now, he's relying on SEALs & Delta	Wants to prevent the NOCLAS from killing hostages. "Hopefully, SEALs will do their job, but doubtful." Thinks there will be significant civilian	Assumed the SEALs would free hostages, but did say that Rangers and Marines would be back-ups to help if needed. Emphasized importance of being

	Team to free hostages. (One reason he wanted EF-111s jamming the radios was to prevent NOCLAS from finding out about the attacks.)	casualties and that we'll have to bail them (SEALs?) out. However, does not develop a contingency plan for doing so.	able to coordinate with a SOC-C command element.
Use of PSYOPS?	Yes, but didn't provide detail other than to say that he assumed that small PSYOPS teams were with Rangers.	Not mentioned.	PSYOPS campaign. Tell civilians that we're here to help you; we're not taking over Arisle. Tell enemy that if you don't give up right now, I'm going to kill you.
# COAs Generated	2	1	2
Which COA Preferred	Would not choose because he said they'd be turned over to the planners for analysis. (Note: Above COA is the one he described first, and it seems more consistent with his intent.)	N/A	Second
How Different From Less Preferred COA	Second COA first secures southern portion of island and did not have a landing in the north. Specifically, the 1 <sup>st</sup> air assault BN lands north of the capital and clears central mountain and sector east of it (instead of landing at Mar Blanche). Then, 2 <sup>nd</sup> BN seizes eastern mountain and clears north (instead of following Rangers	N/A	Same operations, but a different array of forces. The preferred COA has air assault BNs securing Mar Blanche in north, and the MEU as main effort in south. The less preferred COA has MEU securing Mar Blanche in north, and the air assault BNs coming through the airport after the Rangers to

	and clearing around capital). [Note: we assume 1 <sup>st</sup> BN secures capital in 2 <sup>nd</sup> COA, but not clear.]		be the main effort in the south.
Reasons for Preferred COA	N/A	N/A	Based on COA Comparison, the preferred COA has (1) Better speed (it can accomplish the mission within 21 hours while the other can't); (2) Better mass (i.e., force ratios) in the north and south; and (3) more directed at enemy weaknesses.



## STEP 2: PARTICIPANTS' ANSWERS TO THE TRAINING QUESTIONS (STORIES)

### PARTICIPANT CODING

P#1 = Participant #3 from Ft. Riley (May 1998)

P#2 = Participant #1 from Ft. Carson (July 1998)

P#3 = Participant #2 from Ft. Carson (July 1998)

P#4 = Participant #3 from Ft. Carson (July 1998)

P#5 = Participant #1 from Ft. Stewart (September 1998)

P#6 = Participant #2 from Ft. Stewart (September 1998)

P#7 = Participant #4 from Ft. Stewart (September 1998)

Questions	P1	P2	P3
(1) Reasons for your COA?	This question was not asked. Instead, the participant was asked to describe his initial story. He said, "Must divide enemy up and fight on multiple fronts to obtain overwhelming ratios. By attacking him in 3 different spots, we're able to do this & not allow him to use forces to support others."	Participant did not answer this question, but did describe his initial story. Specifically, he said, "We are eliminating the enemy's ability to influence our actions, isolating him, and killing him, [in order to secure the island.] Putting up our fire power against his strengths."	Quickly puts maximum combat power on the island at a given time.  Doing it at night  Good INTEL, so we know where his forces and ADA are.  I concentrated my combat power to exploit fact that enemy is spread out across island
(2) Reasons against your COA?	Not Answered.	Not Answered.	Enemy more familiar with terrain because he's there.  I don't know the capability of the 105 <sup>th</sup> Air Assault Unit  Weather is hot and humid; probably against my forces.
(3) Situation features that had biggest effect?	Size of enemy force, and how spread out they were. So, I	Key terrain had the biggest effect on my COAs, and	Northern terrain, particularly the forest; not a good

	<p>wanted to hit him quickly in locations where his forces could not support each other.</p> <p>My perception of enemy's center of gravity</p>	<p>Enemy's ability to influence my actions.</p>	<p>area for either an air or land assault.</p> <p>High ground in center, because ARTY &amp; anti-tank assets there</p> <p>Landing assault places; I do not want to be near populated areas.</p>
(4) Situation goals?	<p>Get on ground as quickly as possible and defeat him until he's willing to surrender.</p> <p>[His intent was to take the entire island with as little collateral damage as possible.]</p>	<p>To initially eliminate their ability to influence us, and</p> <p>Secure the island.</p>	<p>Quickly insert &amp; mass forces on island to surprise enemy &amp; gain control of southern portion of island ASAP.</p> <p>Uses air power remove enemy's ability to counter 1<sup>st</sup> goal.</p> <p>Princip's of War mass, surprise, economy of force.</p>
(5) All Events connected to your goals?	<p>"No. I could have added more to it to discuss how we defeated each group." Divided enemy into 4 groups: one in south attacked by MEU; one at Mar Blanche attacked by 1 BN, one in plantation &amp; airport attacked by other BN; and one in forest attacked by Rangers.</p>	<p>No, his "initial story" didn't, but his COA development and presentation certainly did.</p>	<p>Yes. Does airfield seizure and amphibious assault at same time so enemy is not sure where we're coming.</p> <p>Then, does air assault onto airfield to get supplies in quickly and to proceed to control capital and southern part of island.</p> <p>Features are interconnected because of the focus on the south. Not going into the forest</p>

			where enemy is concentrated.
(6) Friendly Intent Story?	Yes, within context of initial story and broader COA	Yes, within context of initial story and broader COA	To go in and reestablish order in the south and progress from there.
(7) Enemy Intent Story?	Not explicitly discussed. He pointed out that he didn't spend much time thinking about the enemy's goals.	<p>Participant pointed out that he did not provide much detail about the enemy intent story because the OORDER did this very well.</p> <p>Later identified what he considered to be enemy's most dangerous COA. Specifically, they consolidate their forces in a central location with the hostages, and put-up a better integrated defense. They don't try to secure the entire island, but a piece of key terrain. For example, if they did that on the central mountain, we'd have a hard time freeing the hostages. "Militarily we could still win, but politically?"</p>	<p>"I'm not sure that my story had an enemy intent story. I think I know what he wanted to do. ... to try to protect every place on the island. I didn't think he could do that."</p>
(8) Mission Analysis Story Relevant?	Not answered explicitly.	<p>"Yes, because it takes into account your mission, critical tasks, and essential task."</p> <p>[Note: Did not write it out explicitly.]</p>	<p>I looked at where enemy was, what his capabilities and communications were, and what I believed his intent was.</p> <p>I looked at my combat power,</p>

			<p>combat ratios, &amp; terrain where I could attack.</p> <p>Need to act in 24 hours diplomatically.</p>
(9) Friendly and Enemy Intent?	Not answered explicitly.	"Yes. I defined what success meant to me	(Already answered.)
(10) Correlation of Forces?	<p>Not answered during training, but he did a systematic evaluation of the force ratios for the MEU, assault BNs, and Rangers to assess the feasibility of his COAs during COA comparison. In fact, one reason for recommended COA was "better combat ratios."</p>	<p>Yes. Although he said that he didn't necessarily look at a "3 to 1" ratio, it turned out that "I gave them that. I was assuming that our fire support would be a big factor."</p>	<p>Yes. Looked at force ratios, particularly air superiority. Plan was to bring air in first to knock out key targets before ground troops land. (Also looked at naval assets.)</p>
(11) Rate of Movement?	<p>Not answered during training, but considered during COA development. For example, the purpose of the MEU deception is to get the enemy's reserve out of position so that it couldn't react fast enough to the simultaneous attacks</p>	<p>Yes. "Talked about the light forces landing in the north and being able to maneuver in teak forest and against the high ground."</p>	<p>"I did not really look at rate of movement as much as I probably should have. ... Would do these things with a staff."</p>
(12) Principles of War Story?	Not answered.	"Principles of war undergird everything ... but ... [not] necessary to tell a story about it."	<p>Yes. [Note: Under goals (#4), he mentions mass, surprise, and economy of force.]</p>
(13) Action Execution?	<p>Not answered explicitly, but considered as part of COA development. For example,</p>	<p>"Good to look at this if ... some actions preceding your action. For example, you have</p>	<p>Yes. His sequencing and timing was critical to his COA.</p>

	preferred COA uses 3 simultaneous attacks.	to free the hostages before the main attack. The fire support has to be suppressed before MEU goes ashore. The reserve needs to be killed early so they can't reposition ... Timeline sort of tells a story from an action standpoint."	
(14) Evidence Interpretation?	Not answered explicitly. However, nice example of it before COA devel. He's worried about enemy's Sa-14's (hand-held). But he says, "the aircraft we lost was painted by radar; therefore, probably was not hit by SA-14.)	He said that there really wasn't any. [Note: Not necessarily true. For example, the scenario provided evidence indicating the enemy's ADA was better than initially thought.]	He was initially confused by this question. After clarification, he said that he got this information from the "Road to War" briefing, but he was not specific.
(15) Other Stories?	Not answered.	"Yes, regarding actions of other services (e.g., air force and navy) to influence the fight. Probably would be in correlation of forces."	Yes. He said the diplomatic aspects were not touched on in above stories. Also pointed out importance of media coverage.

Questions	P4	P5
(1) Reasons for your COA?	<p>Incorporates speed, which is critical to accomplishing mission.</p> <p>Avoids the enemy's strength in north to avoid an attrition battle.</p> <p>Taking away his key assets; in particular, his artillery.</p>	<p>My understanding of Higher Headquarters' mission, [which is] prior to a diplomatic decision ... that JTF occupy island prior to deadline.</p> <p>"Occupy" means the urban centers, airport, and port.</p>

		My COA enables us to do that with minimal cost or troops being bogged down in field.
(2) Reasons against your COA?	<p>If Phase 1 (preparing the battlefield) is not successful, the entire mission might fail. (Big thing going for us is that Phase 1 is at night.)</p> <p>He said he had no contingency plan if Phase 1 failed. But later, he started thinking about how to use his Apaches, which are his reserve, if Phase I failed [Note: During Crystal Ball, P4 also decided that giving the air assault brigade a "be prepared mission" to clear the central ridge of ARTY (and ADA?) was a good idea too.]</p>	Not Answered
(3) Situation features that had biggest effect?	<p>Where he put his ARTY, and how it's protected by infantry.</p> <p>Phase 1 preparation to take care of ARTY. [Note: Doesn't seem like a situation feature.]</p>	<p>Ability of the hostages to be used by the guerrilla forces as a liability to the mission.</p> <p>Media's transmission to diplomatic community;</p> <p>Holding the key terrain on the island, that is, the urban centers;</p> <p>[Note: Doesn't see enemy's troops as a key feature initially. Wants to get in there and grab key terrain first; then worry about forces.]</p>
(4) Situation goals?	<p>Take away his strength, which is his ARTY.</p> <p>Seize the political center of gravity, which is the capital and airfield. The capital is the goal. "Assuming that I</p>	This question was not asked directly. However, his goals are the "reasons for COA" above, with control of the urban centers, airport, port, & mine within 48 hours as

	get that and the SEALs get the hostages, the enemy is not going to be successful."	his overriding goal, and securing the hostages as a close second.
(5) Event connected to goals?	<p>"Yes, because of how I phased the operation. If Phase 1 was not successful, I still have the deception in Phase 2."</p> <p>[Note 1: However, didn't start thinking about how he could use Apaches as a contingency for Phase 1 until training.</p> <p>Note 2: Never develops a contingency plan for helping the SEALs.]</p>	Not answered by P5, but they appear to be. For example, P5 was the only participant who had an explicit mission for the Delta Team.
(6) Friendly Intent Story?	Yes, in terms of COA.	Yes in terms of COA, but question not asked.
(7) Enemy Intent Story?	"No, but sort of from the write-up." Paraphrasing, "There's the hostage piece and they want to delay us from going in there quickly and seizing the island. And they want to impose a lot of casualties on us. To do that, they have put ARTY on the high ground so that they can shoot down on us."	Not answered.
(8) Mission Analysis Story?	"Yes," but didn't elaborate.	Not answered.
(9) Friendly and Enemy Intent?	"Yes," but didn't elaborate further.	Not answered.
(10) Correlation of Forces Story?	"Yes, go where he is weak. One of his weaknesses was that he wasn't protecting his ARTY. That played a big role in my COA."	Not answered.
(11) Rate of Movement Story?	"Sort of, because I thought about the Apaches, which were the reserve, having enough time to react to his armor, which would have	Not answered.

	been the counter-attack.”	
(12) Principles of War?	<p>Pluses:</p> <p>Mass, and</p> <p>Surprise (at night)</p> <p>Minuses: Don't have</p> <p>Unity of effort; I have</p> <p>3 different</p> <p>organizations doing 3</p> <p>different things.</p> <p>Command and control;</p> <p>it's going to be tough</p> <p>Didn't think about the</p> <p>enemy's deception plan.</p>	Not answered.
(13) Action Execution?	“Yes, because of the way it was phased to set conditions and take-out the high-valued targets before our soldiers get there.”	Not answered.
(14) Evidence Interpretation?	“Yes, but didn't think about enemy deception.” [Note: He said this in response to a question about it.]	Not answered.
(15) Other Stories?	NOCLAS killing hostages. “I really didn't think about that” when developing COA. [Note: First mentioned in response to an action orientation question.]	Not answered.

Questions	P6	P7
(1) Reasons for your COA?	<p>Enemy's center of gravity is “a show of strength” in capital near the American Compound. It gives him legitimacy, and I want to remove that legitimacy.</p>	<p>Rapidly eliminate the enemy's ability to continue to resist.</p> <p>Secure the freedom and safety of as many hostages</p>



	That's why I consider that area, capital, airport, and compound as main effort.	<p>as possible.</p> <p>On the operational and strategic level, the rapidity of action is to ensure that Mainlandia doesn't have enough time politically.</p> <p>Applying combat power that is well suited to its target. Using attack aviation against ARTY and fixed sites that can't defend themselves. Using Rangers to take airport. Using Marines' amphibious &amp; air assault capabilities. And using air assault in more restrictive terrain in north.</p>
(2) Reasons against your COA?	Not answered.	<p>Inability to ensure that 100% of the hostages will be safely extracted.</p> <p>"Our plan is wholly dependent on our ability to take out the enemy's ADA. While we have a reasonable assurance of success at taking out the SA-11s and SA-13s, their SA-14s (their equivalent to our Red-Eyes), is harder nut to crack."</p>
(3) Situation features that had biggest effect?	<p>Location of enemy air defense.</p> <p>Location of enemy BN Headquarters.</p>	<p>Terrain</p> <p>Speed of operations</p> <p>Requirement to free hostages</p> <p>Requirem't to minimize collateral damage.</p>
(4) Situation goals?	<p>To eliminate or suppress enemy air defense.</p> <p>Remove enemy's ability to communicate.</p> <p><b>Top-level goal:</b> Securing</p>	<p>"Our goal is to recapture control of the island and reduce the enemy's ability to sustain military operations. My story takes into account all these [i.e.,</p>

	<p>the island by removing enemy's reason for being there. We're going to secure the capital, American Compound, and airport, thereby removing their legitimacy. We're going to bring in more forces and they can't because of our blockade. We can take the mine anytime, which is their economic reason for being there. We're not going to have many casualties because we're avoiding combat. Since they'll have no reasons for being there, they'll surrender.</p> <p>Freeing the hostages is a secondary, top-level goal.</p>	<p>the above] features."</p> <p>Other goals mentioned:</p> <p>Ensure safety of hostages;</p> <p>Minimize casualties;</p> <p>Minimize collateral damage.</p>
(5) Event connected to goals?	<p>Yes. Actions &amp; sequencing in his COA is directly tied to his top-level goal.</p>	<p>Yes. We talk about:</p> <p>SOF's ability to secure the hostages;</p> <p>Our ability to take-out SA-13s lets us introduce air assault troops; and</p> <p>Being objective-oriented by going after the enemy and reducing his ability to continue combat operations.</p> <p>Since the enemy not in population centers, that should allow reduction in collateral damage.</p>
(6) Friendly Intent Story?	<p>Yes, in his goals &amp; COA.</p>	<p>Yes.</p>
(7) Enemy Intent Story?	<p>Not discussed much except for how NOCLAS might use hostages and media to show world that we really don't control the island.</p>	<p>Key element is to stop him from having enough support to stop our intervention.</p>
(8) Mission Analysis Story?	<p>Yes, in his goals &amp; COA</p>	<p>"My COA was based on the</p>

		friendly intent. The mission analysis was pretty clear; destroy the enemy and regain control of the island. The intent included minimizing casualties and ensuring the safety of the hostages."
(9) Friendly and Enemy Intent?	Answered above and in COA.	Answered above and in COA.
(10) Correlation of Forces Story?	Thought it was important for overwhelming enemy's ADA. Didn't think it was as important for ground troops because his intent to secure airport, capital, and adjacent area resulted in large force ratios. "I'm going after platoons with a brigade."	[No] "I applied the right type of combat force, not combat power, against specific enemy targets. If I had used "correlation of forces," I would have put the Marines up north to go after their armor forces. The Marines were the only ones in this task force that had the ability to hit the armor forces with like combat power."
(11) Rate of Movement Story?	Said he took this into account. "I didn't want to spread everything out on the whole island because you'd never be able to concentrate forces. Until you get some trucks on the island, they're walking, and they're walking in 95 degree weather with humidity." So, they're not moving fast.	"Did play in my decision making, but only in the sense that, based on the estimate of the enemy's capabilities, I did not allow them to have a similar rate of movement that we would attribute to our forces."
(12) Principles of War?	Concentration;  Surprise a little; "... but hell, if I start hitting them with naval gunfire, they're going to know when I'm coming."  Exploit their weaknesses and avoid their strengths; and	Not answered.

	Simplicity. "This plan – I think it's simple. Some guys get so wrapped up in some grandiose plan, & it gets out of control."	
(13) Action Execution?	Yes. Participant focused on the synchronization of the naval gunfire with the supporting efforts in the west and east before the main effort kicks off.	Not answered.
(14) Evidence Interpretation?	"Yeah, are those hostage locations reliable? Credible?"	"At this point, we have some surveillance on the ground. We think we know where the hostages are and we have a pretty idea of where the enemy is. But we're still 21 hours from H-Hour. ... while we have objectives tied to terrain features, we are force-oriented. So, [Engagement Areas] Eagle and Hawk may shift if he moves his artillery because we want to destroy his indirect fire against the airhead."
(15) Other Stories?	Participant doesn't think so.	No.

## STEP 2: PARTICIPANTS' ANSWERS TO THE TRAINING QUESTIONS

### (Time Orientation)

#### Participant coding

- P#1 = Participant #3 from Ft. Riley (May 1998)  
 P#2 = Participant #1 from Ft. Carson (July 1998)  
 P#3 = Participant #2 from Ft. Carson (July 1998)  
 P#4 = Participant #3 from Ft. Carson (July 1998)  
 P#5 = Participant #1 from Ft. Stewart (September 1998)  
 P#6 = Participant #2 from Ft. Stewart (September 1998)  
 P#7 = Participant #4 from Ft. Stewart (September 1998)

From an Introductory Perspective, the Number of Different Types of Actions

Type	P1	P2	P3	P4	P5	P6	P7	Means
Proact.	5	7	3	4	5	4	3	4.4
Predict	4	6	2	2	2	1	5	3.1
Reactiv	1	4	2	3	1	2	2	2.1
Sum	10	17	7	9	8	7	10	9.7

This suggests:

- Our participants tended to identify proactive actions the most, and reactive actions least; and
- Six of the 7 participants identified between 7 to 10 actions total; P2 identified 17.

Questions about Time Orientation	P#1	P#2
Proactive Actions in Your COA? [Note: Issues with respect to how the participant framed the mission, are considered after "reactive actions."]	<p>Tried to keep enemy divided so he couldn't mass his forces.</p> <p>Hit enemy at different spots, with key terrain between those spots, taking away his ability to react because he doesn't know which way we're really going.</p> <p>By attacking; I'm not</p>	<p>Attacking and taking away the high ground.</p> <p>Taking away fire support (on high ground),</p> <p>Preventing enemy from repositioning his reserve,</p> <p>Freeing the hostages so they can't be used as a negotiating tool to prevent an attack.</p>

	<p>reacting to what he's doing.</p> <p>Getting control of hostages first so we're free to be proactive and make our maneuvers.</p> <p>Note: Early in his thinking, he noted that the mine was one of the major reasons we were involved, so we want to control it quickly before he can blow it up.</p>	<p>Eliminating his Migs</p> <p>Going after his FM communications to disrupt his C2, including using our guys on his nets to misdirect his forces</p> <p>PSYOPS</p>
Predictive Actions?	<p>He's predicted that the enemy will move his force into the forest. So, he's using the Rangers to clear the forest.</p> <p>He predicted that enemy will move forces from pineapple plantation. So, hit the plantation to stop enemy from using road to move his forces.</p> <p>Predicted that enemy on hills would attack our troops. So, he used air strikes so they would be trying to recover when we attacked.</p> <p>Note: Early in his thinking, he confidently predicted that our air forces could neutralize the enemy ARTY on the hills.</p>	<p>Predicted that without his reserve the enemy couldn't quickly reposition his forces, so he'd have isolated fights.</p> <p>Predicted that enemy C2 would fall apart if we eliminated his FM communications.</p> <p>Predicted that enemy would not be able to get supplies or additional forces on battlefield.</p> <p>Predicted enemy would disperse and move his ADA to make them hard to find and kill.</p> <p>Predicted that mission would be unattainable if we lost X amount of aircraft carrying troops. So, we had to suppress enemy air defense.</p> <p>Predicted the success of the SEALs because we had confirmed hostage locations. [Rangers have a be prepared mission to help free hostages.]</p>
Reactive Actions	<p>I have to react to the fact that he currently owns the</p>	<p>We'd have to readjust and be more cautious if they</p>

	<p>airport. I have to regain control of it to set-up a logistics base.</p> <p>[He had nothing else to add. He said, "Predictive and reactive in a plan sort of run together." They're different things on the battlefield.]</p>	<p>successfully hide their fire support and ADA assets so we don't get expected Battle Damage Assessment.</p> <p>We'd have to react if some of our forces were degraded or compromised; for example, if we lost aircraft with a parachute BN or the MEU's ships broke down or they couldn't come ashore.</p> <p>Unless the weather got really bad, we should be okay because we have an all-weather capability</p> <p>We'd have to adjust significantly if the SEALs fail completely</p>
<p>Issues with respect to how the participant framed his mission. [Note: Adelman added this section here to help in understanding the participants' responses.]</p>	<p>Initially, spent time trying to understand why we had to attack. "Why can't we first try non-aggressive measures, which is what we first did with Desert Shield?" Also thought US should be able to do a better PR job than Mainlandia to stop them from getting a diplomatic victory.</p> <p>Defined the American center of gravity from the broad perspective of how could Mainlandia have the audacity to take Arisle. His definition of "center of gravity" determined the COA he selected. "If the center of gravity is just retaking the mine, then COA #1 is preferred. If the American center of gravity is getting the Mainlandian force off the entire island, then COA#2 is preferred."</p>	<p>Participant spent a lot of time trying to understand what "control of island" meant. He decided that it meant (a) eliminating the enemy's offensive capability along the ridgeline (fire support and ADA), and (b) controlling the southern part of Arisle. This frame affected his COA and proactive actions.</p> <p>"Our primary mission is not to kill every bad guy. [If] we control the high ground &amp; southern half of the island, ... I think we can say that the island is secure."</p> <p>"If we loose the hostages, we still win the fight, but it's less of a victory for us.</p>

	During COA comparison, P1 examined the written materials again and concluded that the center of gravity was to get all Mainlandian forces off Arisle.	
--	---	--

Questions about Action Orientation	P#3	P#4
<b>Proactive Actions in Your COA?</b> [Note: Issues with respect to how the participant framed the mission, are considered after "reactive actions." ]	(1) Being on the offensive (2) Seizing the capital (3) Taking out the enemy's C2 sites to prevent communication. Forces the enemy to be reactive	(1) Taking away enemy's strength (ARTY) early and at night. (2) Using our predictions to create our deception with MEU (3) Using attack helicopters as a reserve to prevent enemy counter attack. (4) Using PSYOPS to get the enemy to give up.
<b>Predictive Actions?</b>	(1) The enemy would predict that we'd do an amphibious assault (2) Enemy would predict we'd trying to free all hostages, but we don't have the assets. [Participant said he had trouble with this question.]	(1) Deception in east; we're predicting he'll react by sending his mobile reserve there. (2) Predicting that enemy will not think we'll land in center, which is in range of his ARTY.
<b>Reactive Actions</b>	(1) The invasion. We're reacting to Mainlandia taking Arisle. (2) We're reacting to his counter-fire assets by bringing in the Q-36s. [Based on other things he said, it's not clear that the participant understood what we meant by "action orientation." ]	(1) Depending on what his reserves and armor do in the north, our reserves will have to react. (2) If the SEALs are not successful and the NOCLAS start killing people (and getting that information to media), "my plan has problems" We'd have to react. (3) Clearing out enemy



		forces if don't surrender
Issues with respect to how the participant framed his mission.	<p>(1) Enemy center of gravity is ability to communicate with all his forces. So, P3 wants to knock out enemy's commo. "If that's done, the enemy won't have a unified force to bring action against us."</p> <p>(2) Never discusses the American center of gravity. But did note he had to act in 24 hours.</p>	<p>(1) Enemy's strength is in the north, but there is nothing critical there.</p> <p>(2) Enemy's infantry is spread out, so it's not a threat because it can't mass quickly.</p> <p>(3) Enemy's biggest threat is ARTY on central hills</p> <p>(4) If we control south and key terrain in center, we've won.</p>

Questions about Action Orientation	P#5	P#6
<p>Proactive Actions in Your COA?</p> <p>[Note: Issues with respect to how the participant framed the mission, are considered after "reactive actions."]</p>	<p>(1) By getting into the airport, the mine, and urban centers, I was proactive with respect to preventing their destruction, and with respect to the media and my diplomatic goals.</p> <p>(2) Took out enemy assets along ridgeline early so they couldn't affect me.</p> <p>(3) [Experimenter pointed out that by taking the mine right away he eliminated Mainlandia's economic goal for being there.]</p> <p>(4) Wanting to use enemy's C2 (instead of destroying it) to talk with enemy troops &amp; NOCLAS.</p> <p>(5) Preventing enemy from moving his heavier northern troops south. (Happy to let enemy</p>	<p>(1) Taking down enemy's communications in capital.</p> <p>(2) Taking out the enemy's ADA.</p> <p>(3) Taking the western and central mountains, and the roads between the central and eastern mountains, to deny enemy reinforcements into the city.</p> <p>(4) Experimenter points out that participant was being proactive by seizing the points he considered critical in the south, and explicitly not going after the enemy troops in the north since they did not affect his goal.</p>

	stay where he is.)	
Predictive Actions?	<p>(1) Predicted enemy ambushes in forest.</p> <p>(2) Predicting that he could isolate enemy troops because they were thinly manned in the south.</p>	<p>(1) Predicted that enemy forces would stay in the forest. [Note: He was not going in to get them; that is, he was not reacting to them.]</p>
Reactive Actions	<p>I'd have to be reactive if NOCLAS take hostages into teak force (or enemy goes there instead of surrendering).</p>	<p>(1) Would be reactive to bad intelligence; for example, regarding enemy locations.</p> <p>(2) Would <b>not</b> react if NOCLAS started killing hostages. He was not going to change his operation. [Note: Said MEU might help free hostages in south, but would do nothing about hostages in north.]</p>
Issues with respect to how the participant framed his mission.	<p>(1) "We're on a very short fuse. ... So, the key was to seize ... the urban centers [Beauqua &amp; Mar Blanche, and the American Compound, airport, and port]."</p> <p>(2) "Later on, the issue of coming in here and cleaning up all these units that are dispersed [in] clearly difficult fighting terrain, can be done over time. But to win this thing diplomatically, we have to first get into the urban centers."</p> <p>(3) "I am fully confident that I have the ground forces to deal with regular armed forces. The one thing that could really muddy the water</p>	<p>(1) Goal is to secure the southern part of island first to remove the enemy's legitimacy for being on Arisle. Key points are airport, capital, and western &amp; central mountains. (The mine is less important because he can take it at any time.)</p> <p>(2) Once he's secured the south and increased his forces there to a critical mass, he'll go after the enemy troops in the north and forest if they haven't surrendered. However, he thinks the enemy will surrender because there is no chance of reinforcement because the island is blockaded, and they've</p>

	<p>is NOCLAS guerrillas, and their capability to "do a Somalia" and really bring this thing to a screeching halt based on their ability to exploit the hostages."</p> <p>[Note: P5 makes sure SEALs have hostages under surveillance, also uses Delta team to free hostages in and around American compound, &amp; has Rangers as a reserve for freeing hostages.]</p>	<p>lost their legitimacy for being there because they no longer control the southern part of Arisle.</p> <p>(3) Freeing the hostages is a very secondary goal. He assumes that the SEALs can do it, although MEU might have to help. He admitted that he basically disregarded the hostages when developing his COA.</p>
--	--	--

Questions about Action Orientation	P#7
<p><b>Proactive Actions in Your COA?</b></p> <p>[Note: Issues with respect to how the participant framed the mission, are considered after "reactive actions."]</p>	<p>(1) Use of attack aviation against enemy's heavy forces along western, central, and eastern ridgeline, and in pineapple plantation.</p> <p>(2) The timing and rapidity of the operation. [We're proactive because we're responding faster than the enemy expects us to, and faster than enemy can react.]</p> <p>(3) Simultaneous amphibious, airborne, and helicopter assault operations to establish a hold on the island and a base of operations.</p>
<b>Predictive Actions?</b>	<p>(1) Establishing the ridgeline and plantation as critical objectives. We're predicting that the enemy is not going</p>

	<p>to leave those locations.</p> <p>(2) Predicting we can free the hostages while simultaneously initiating our assault.</p> <p>(3) Predicting that our efforts to severely limit the enemy ability to communicate (and react) will be successful.</p> <p>(4) As a result, predicting we'll have time to establish airhead &amp; put in sufficient forces to continue the operation clearing the sector before enemy can react with follow-on force.</p> <p>(5) Predicting our HARM missiles &amp; counter-measures will defeat the enemy's ADA assets.</p>
<b>Reactive Actions</b>	<p>(1) Noted that the enemy is there; so, our whole response is reactive.</p> <p>(2) Our reactive aspects of this operation are very limited. Militarily, the outcome is a foregone conclusion. Politically, it will be a success or failure by how well we limit casualties and collateral damage.</p>
<b>Issues with respect to how the participant framed his mission.</b>	<p>Participant's intent was to destroy the enemy and rapidly regain control of Arisle. His COA of three simultaneous attacks (Rangers taking airfield, MEU landing in south, and an assault BN attacking Mar Blanche) with follow-on missions to "clear in sector" is consistent with his intent.</p>

	<p>Also was concerned about (1) freeing the hostages, so he had Delta Team help the SEALs, &amp; (2) minimizing collateral damage, so he had EF-111s doing "non-lethal jamming" and didn't use B-52s with their iron bombs.</p> <p>In addition, (3) he tried to minimize casualties by simultaneous attacks after setting the conditions, and by putting the right combat force against targets. [Principles of war mentioned were mass, surprise, economy of force.]</p>
--	---

## STEP 2: PARTICIPANTS' ANSWERS TO THE TRAINING QUESTIONS

### (Identifying Gaps)

#### Participant coding

P#1 = Participant #3 from Ft. Riley (May 1998)

P#2 = Participant #1 from Ft. Carson (July 1998)

P#3 = Participant #2 from Ft. Carson (July 1998)

P#4 = Participant #3 from Ft. Carson (July 1998)

P#5 = Participant #1 from Ft. Stewart (September 1998)

P#6 = Participant #2 from Ft. Stewart (September 1998)

P#7 = Participant #4 from Ft. Stewart (September 1998)

Question	P1	P2	P3
What events did you want to know more about?	<p>(1) What was the enemy's intent?</p> <p>(2) What was the last piece of terrain the enemy wanted to hold? For example, if knew that, if everything went badly, enemy wanted to withdraw his forces from island using Mar Blanche, then you'd want to take Mar Blanche early to be in position to destroy him. [Note: This seems intent oriented.]</p> <p>(3) Extraction of the hostages.</p> <p>(4) [Note: Under "deconflict," he identifies "another gap.</p>	<p>(1) Morale of enemy forces? Willing to fight to last man?</p> <p>(2) Effectiveness of enemy fire support; their ability to put steel on target.</p> <p>(3) Effectiveness of enemy ADA? Is there something that I can do as ground comp. commander to help our pilots?</p> <p>(4) More info about friendly forces. Assuming that everything is about 100%: morale good, leaders there, maintenance good.</p> <p>(5) Assuming that we can go even if weather bad.</p>	<p>(1) About enemy. The more you know, the better.</p> <p>(2) The media</p> <p>(3) Different avenue for diplomatic negotiation. At division level, you need to know what's going on two levels up.</p> <p>(4) "Small stuff," like tides and weather.</p> <p>(5) Ramifications of attacking island. Anyone coming to their aid?</p> <p>(6) Japanese, Canadian, and Australian citizens on island. Are these countries going to assist us?</p> <p>(7) If all hostages American. He had assumed so.</p>

	<p>Why isn't the airfield better defended? More generally, he can't figure out the enemy's intent in positioning his forces. He's not defending the mine, which is his supposed purpose for being there, or the beach or airfield well.]</p>		<p>(8) More about terrorists. Where they are; what their actions and reactions might be in different situations; if they'd held hostages before, and how it turned out.</p> <p>(9) Rules of Engagement had not been specified. [Noted during "Evaluate."]</p>
<p>Were these events in your story? If yes, how were they included? If no, how would you include them in your story?</p>	<p>(1) Enemy intent not part of his story because he admitted that he didn't think much about the enemy's goals.</p> <p>(2) Never discussed what terrain he thought the enemy would hold on to last.</p> <p>(3) He said he'd change his story to enhance the safety of the hostages by creating "no fire areas" until he knew if hostages were released.</p> <p>(4) Since his goal is to destroy the enemy force, his preferred COA goes after the enemy (&amp; ARTY) first and</p>	<p>(1) Enemy morale not part of his story, and not discussed here.</p> <p>(2) Pointed out that COA#1 did not deal with the enemy's fire support element in the pineapple plantation. So, s recommended COA (i.e., COA #2) had the Apaches attacking them.</p> <p>(3) Didn't deal with ADA gap.</p> <p>(4) Didn't deal with knowledge gap about friendly force or weather</p>	<p>Some were and some weren't. For example, he hadn't talked about media, weather, or tides.</p> <p>This question caused him to identify other gaps.</p> <p>(1) We'd like more info about the mine (and area around it) before amphib. assault.</p> <p>(2) Refugees from island. They could interfere with SEAD, and need to pick them up from sinking boats.</p> <p>(3) Admitted he had not thought about enemy's most dangerous COA. Thought our INTEL was good, and that enemy didn't</p>

	risks taking the mine later.		have capability to do deception.
Why is the gap important?	<p>(1) Consider the gap about enemy intent "most important" because he wants to destroy the enemy force.</p> <p>(2) Destruction of enemy force is also why he wants to know about what terrain they'd want to hold.</p> <p>(3) Safe extraction of hostages is a secondary goal.</p> <p>(4) Gaps in our knowledge of the enemy's true positions &amp; intent could affect operation's success. [Note: All gaps seem tied to knowing enemy intent.]</p>	Only discussed the importance of the gap regarding the effectiveness of the enemy's fire support. Rangers & assault BNs would take more casualties seizing mountains, and MEU coming ashore, if enemy fire support was more effective than we thought.	<p>(1) Thought media gap was critical to fill because he has to know how to deal with the media. "I should have considered [it] because it's critical to achieving my goal."</p> <p>(2) Knowing more about the enemy (METT-T) important.</p>
How would you fill the gap?	From HUMINT (from SEALs or guys on the ground) or photo imagery.	Only discussed how he'd fill the gap in information about enemy's willingness to fight. Said he'd look at historical evidence regarding how they've fought over last 10 years, & how successful they've been.	Not answered.



Question	P4	P5
<p>What events did you want to know more about?</p>	<p>(1) Whether depicted enemy situation correct? For example, were things hidden in capital?</p> <p>(2) Where's the enemy's brigadier general? Find his headquarters.</p> <p>(3) Where are the shoulder fired ADA? These could take out my Rangers. [Note: Very concerned about this gap.]</p> <p>(4) During the "Stop" exercise, P4 noted that, "Another thing that I didn't think about was mines in the harbor delaying the MEU."</p>	<p>(1) How the SEALs are doing. For example, whether the SEALs have gotten the hostages away from targeted ADA sites. Wants to make sure our air strikes don't kill hostages.</p>
<p>Where these events in your story? If yes, how were they included? If no, how would you include them in your story?</p>	<p>No.</p>	<p>Yes. "If there are SEAL teams out there with eyes on [hostages], then I should be able to receive that info through the system.</p>
<p>Why is the gap important?</p>	<p>"Not knowing the exact location of the enemy's air defense is definitely connected to me accomplishing my goal. I'm relying on the Rangers ... &amp; if one of those shoulder fired missiles shot at a C-130, I [could] lose an entire company." That's bad enough, but now also have to use reserve to take care of ARTY and ADA.</p>	<p>Yes. "If I have a sinking feeling that that I can not ensure the safety of at least a significant portion of the hostages, then I would need to rethink the plan, possibly dedicating more of my assets to the hostage seizure first, and then seizing the rest.</p>
<p>How would you fill the gap?</p>	<p>One of the PIRs would be find the location of ADA. In addition, I would need battle damage assessment for Phase 1 (prep.) before proceeded with Phase II (MEU</p>	<p>Not answered. But P5 did point out that, in addition to the SEALs, Delta Team, and Rangers, the island is small enough that his "light forces" (MEU and air assault brigade?)</p>

	Deception and Rangers). Potential problem of tight time line. But need confirmation that SA-11s' radar are jammed and SA-11s and SA-13s are destroyed. This is a critical information requirement.	might be able to help rescue hostages too.
--	--	--

Question	P6	P7
What events did you want to know more about?	Not answered.	<p>(1) When answering question, he said that he wanted to know a lot about the enemy. For example,</p> <ul style="list-style-type: none"> <li>- Status of their equipment?</li> <li>- Level of training?</li> <li>- Combat experienced as a revolutionary army?</li> <li>- Did they take 20 years to gain power and have a lot of combat veterans or are they untested?</li> <li>- What are their communications capabilities?</li> </ul> <p>(2) While developing the COAs, he wanted to know more about the Special Operations Force. Where were the SEALs, and what was their status? Plans for the Delta Force? He also wanted to know more about the terrain and what national intelligence was doing.</p>
Where these events in your story? If yes, how	Not answered.	Said above events were taken into account when

<p>were they included? If no, how would you include them in your story?</p>		<p>developing his story. When asked if there was anything else that he thought about later, he said the following:</p> <ul style="list-style-type: none"> <li>(1) Talked about SA-11s and SA-13s initially, but hadn't considered the hand-held SA-14s.</li> <li>(2) Wasn't until COA #2 that he addressed the possibility of enemy armor moving south.</li> <li>(3) Wasn't until he began assigning sectors of responsibility that he realized that there was only a BN headquarters in Beauqua, and not a battalion.</li> </ul>
<p>Why is the gap important?</p>	<p>Not answered.</p>	<p>MI assets, both at the division and national level, can gather a lot of information.</p>
<p>How would you fill the gap?</p>	<p>Not answered.</p>	<p>With respect to information about the enemy, he said he would use [all] sources to get more information about the enemy. He particularly focused on wanting to know about communications, including Arisle's communications infrastructure.</p> <p>"I would be screaming for direct coordination with the SOF Commander to know what his direct action plan is. ... How does he plan to deploy the [Delta Squadron]? How does he plan to evacuate them once they have the hostages? What's his plan of attack to</p>

		take down 15 sites simultaneously with a 40-man [SEAL] element? I think that's the weakest part of the whole scenario."
--	--	---

## STEP 2: PARTICIPANTS' ANSWERS TO THE TRAINING QUESTIONS

### (Deconfliction)

#### Participant coding

P#1 = Participant #3 from Ft. Riley (May 1998)

P#2 = Participant #1 from Ft. Carson (July 1998)

P#3 = Participant #2 from Ft. Carson (July 1998)

P#4 = Participant #3 from Ft. Carson (July 1998)

P#5 = Participant #1 from Ft. Stewart (September 1998)

P#6 = Participant #2 from Ft. Stewart (September 1998)

P#7 = Participant #4 from Ft. Stewart (September 1998)

Questions	P1	P2	P3
Examples of conflicting information?	Story leads you to believe that one of the big reasons the enemy wanted Arisle was the mine. But he didn't mass his forces to defend it (or the beach or airport) well. Does he think he has it covered with ARTY on hills or does he have a different intent or purpose for taking Arisle? The conflict is important for understanding enemy intent, and why they're in their current positions and what they're trying to protect.	Participant didn't identify any conflicting information. He initially said that he missed the conflict about the enemy's ADA in the scenario, but then said that if our SEAD was successful, enemy ADA would be suppressed regardless of type.	Needed clarification & prompting to answer question.  Didn't bring up any example of conflicting information.
How resolved conflict in information?	"Diplomatically , try to figure out his goals. What is he really after? Why is he there? Why is he willing to jeopardize the lives of the people he has	Put someone on ground to identify ADA weapon and (or) use special aircraft packages, like Wild Weasel and Phantoms in Vietnam.	Not applicable.

	there?"		
Did participant mention conflict re. enemy's ADA?	No	No (See above)	When conflicting noted by researcher, P3 said he had noticed it. He didn't give it much thought because he thought we'd be able to knock the ADA out.
Examples of conflicting goals?	He's trying to gain the international community's legitimacy for his presence in Arisle. But he's threatening to kill the hostages. Killing hostages will not gain him legitimacy from the other island nations and it will bring more international wrath upon him. "So, big conflict."	<p>(1) <b>Low casualties</b>, which argues for a establishing a base and moving methodically from it, <b>versus the need to act quickly</b>, which argues for simultaneous attacks that may increase casualties</p> <p>(2) Doesn't want hostages killed, but doesn't want concerns about hostages to hinder combat operations.</p>	When asked if he felt conflict between diplomatic and military situation, he said that he felt pushed to a military operation, similar to Haiti.
How resolved conflict in goals?	"The conflict isn't with my goals, it's with his goals. By first freeing the hostages, and then going in quickly with minimal collateral damage, I meet my goals."	<p>(1) Methodical buildup would not achieve the mission, so he dismissed it.</p> <p>(2) Achieving mission weighed more heavily than casualties, soldier or hostage.</p> <p>[Goals resolved in favor of mission success; defined as quickly eliminating</p>	Didn't answer

		enemy on ridge & securing southern half of island.]	
Participant mention conflict between controlling island quickly and safely freeing hostages?	No. He assumes he can do both.	Yes; see point #2 above.	When asked if he felt any conflict between the military goals and not having any hostages killed, he said that he considered the latter unrealistic because the formal government does not control hostages. [In his COA, he only tried to save hostages in south.]

Questions	P4	P5
Examples of conflicting information?	Didn't give any. [Note: Having trouble with audio tape, so may have missed it]	(1) "All hostages under surveillance," but only 40 SEALs for 144 hostages. "That would be my #1 conflicting evidence. The warm and fuzzy that I have for the hostages and forces currently on the ground's capability to observe & take action." (2) Most of enemy's forces gravitating to the north, but except for Mar Blanche, the key sites to control are in the south.
How resolved conflict in information?	N/A	(1) Not answered, but P5 emphasized that he could use also use other troops (e.g., Rangers & even other forces) to help free hostages. (2) Emphasized he's not force oriented; so leave

		them alone. As long as friendly troops control key sites, including urban centers, he's not worried. He'd use PSYOPS & enemy comms to try to get troops to surrender, & send Rangers after those who don't in Phase 2.
Did participant mention conflict re. enemy's ADA?	Although worried about the location of enemy's ADA, he didn't discuss conflict regarding the ADA being sophisticated enough to down one of our aircraft.	No
Examples of conflicting goals?	(1) Speed of mission vs. trade-off to get hostages (2) Not taking enough time to prepare because trying to go too fast.	Focused solely on potential conflict between seizing control of island and freeing hostages.
How resolved conflict in goals?	(1) Focusing on accomplishing the military mission. Has no contingency plan for hostages. [At the end of training, P4 said one of the major insights of the training was that he did not adequately consider the situation where the SEALs failed at their mission, and NOCLAS began killing hostages, when developing his COA. Unfortunately, he did not resolve it during training either.] (2) Doing what he can; focusing on accomplishing mission by securing southern half of island.	Resolved conflict by reiterating that controlling the island is the more important goal. "Although the more I talk about it, the more I sound like I'm having conflicting goals of occupying parts of the island and saving hostages, I would still go back to I have the one goal of occupying. ... there's a certain point of acceptable risk of losing hostages up to a degree. So, I want to try to stay focused on one goal with another implied task of 'let's not let them get slaughtered in the process.'"
Participant mention	Yes; see above.	Yes; see above.



conflict between controlling island quickly and safely freeing hostages?		
--	--	--

Questions	P6	P7
Examples of conflicting information?	Not answered. ("Deconflict" questions about were not on the tapes. Don't know if they were asked or not.)	<p>(1) That they were able to move forces from Mainlandia without our knowledge.</p> <p>(2) That we know the locations of the enemy forces. "It said it was overcast and that we didn't have a good picture of the island. Yet, we've pinpointed the location of their artillery batteries and the armor forces."</p> <p>(3) "The fact that they have their heavy forces to the north, yet the strategic objectives for the island are in the south. For example, the airport is the center of mass for the island. Yet, they have their tanks up north."</p>
How resolved conflict in information?	Not answered.	Only answered question for the last conflict. "Pretty significant if you're the Ranger jumping onto the airfield and you run into 3 BMD-1s. However, we do have assets that are capable of taking them out. That's why I gave the AC-130 support to the Rangers initially. That's how I dealt with the conflict."
Did participant mention	Not answered.	No, but he did mention

conflict re. enemy's ADA?		that "the enemy was expected to have local air superiority at times, even though we have global air superiority over the island." The way he dealt with this was by using the F-16s and F-4s as Close Air Patrol to minimize the enemy's ability to gain local air superiority at critical points. "Those critical points are when we have 34 helicopters moving a battalion and when we have MC-130s flying over the airstrip dropping Rangers or landing at the airstrip."
Examples of conflicting goals?	Not answered.	(1) "Destroy the enemy, but minimize collateral damage." (2) "Destroy the enemy, but we don't want to indiscriminately kill the hostages."
How resolved conflict in goals?	Not answered.	These conflicts are very important. "... there is no doubt about the success of the operation militarily. We will take down the island. We will destroy the enemy. However, politically, will it be determined a success if out of the 144 hostages, 120 are killed and we have 2,000 civilian casualties? I would say the answer is 'no'." "The JTF plan must resolve that conflict. The division plan can't because of the way the forces are arrayed and who has operational control. The mission of securing the

		<p>release of the hostages has been given to the SOF element. So, all I can do is minimize collateral damage.</p> <p>I do that by making sure that the assets that I send in against certain targets maximize destruction while minimizing casualties. That's why the Rangers and AC-130 are taking down the airfield. That's why the Marines are going in on the southern beach ... [because] these are sparsely populated areas. So, we can minimize risk..."</p>
Participant mention conflict between controlling island quickly and safely freeing hostages?	Not answered.	Yes; see above.

## STEP 2: PARTICIPANTS' ANSWERS TO THE TRAINING QUESTIONS

### (Evaluate)

#### Participant coding

P#1 = Participant #3 from Ft. Riley (May 1998)

P#2 = Participant #1 from Ft. Carson (July 1998)

P#3 = Participant #2 from Ft. Carson (July 1998)

P#4 = Participant #3 from Ft. Carson (July 1998)

P#5 = Participant #1 from Ft. Stewart (September 1998)

P#6 = Participant #2 from Ft. Stewart (September 1998)

P#7 = Participant #4 from Ft. Stewart (September 1998)

Questions	P1	P2	P3
Key assumptions?	<p>(6) "My biggest assumption is that special ops. guys can get the hostages out." [Made early in COA develop.]</p> <p>(7) As developing COA, also assumes MEU will have a Q-36 radar to figure out where remaining enemy ARTY is firing from.</p>	<p>(1) Everything is about 100% for friendly forces: morale good, leaders there, maint'nce good.</p> <p>(2) Assuming that we can go even if weather bad.</p> <p>(3) INTEL picture fairly accurate.</p> <p>(4) SEAL teams successful.</p> <p>(5) Naval and air forces support successful</p> <p>(6) SEAD suppress fire support and ADA to permit us to accomplish mission</p> <p>(7) Rangers find a suitable drop zone near high ground, and no massacre coming down in parachutes.</p> <p>(8) Suitable landing</p>	<p>(1) First assumption was that I had to do a military op.</p> <p>(2) Diplomatic neg would not end in time.</p> <p>(3) Enemy was not a sizable or capable force.</p> <p>(4) Enemy had a C2 conflict between ground forces &amp; those controlling hostages.</p> <p>(5) Neither the pineapple plantation nor forest was good for operations.</p> <p>(6) Weather would be cooperative.</p> <p>(7) Air superiority. Why didn't worry about ADA conflict.</p>

		<p>zones for helo.</p> <p>(9) Migs &amp; HINDs (for moving reserve) mainly killed on ground</p> <p>(10) We cut their communications</p>	
Were these assumptions important?	<p>(1) Freeing hostages very important. "My goals are little collateral damage, get the hostages out safe, &amp; destroy his forces. I won't get the hostages out safe if I lead with gun ships, which my plan does, and the hostages are there. I won't accomplish my goals."</p>	"Yes, very important."	Yes.
Were these assumptions reliable?	Yes.	Yes.	Didn't say if they were reliable; said they were plausible.
Two different stories?	<p>He answered the question, "How would you expand your story?" by saying that, in addition to Rangers, he'd look at MEU's special ops. capabilities. Also, he'd taking away enemy C2 by destroying as much communications as possible &amp; jamming frequencies enemy's</p>	<p>Assumptions about securing hostages probably would not hold for "the enemy's most dangerous COA," consolidating on the central mountain with the hostages. "SEAL teams would have a very difficult time getting the hostages out, &amp; they would be more in the direct fight.</p>	<p>Enemy's most dangerous COA would be concentrating his force overlooking the airport. Keep ADA in camouflage; let 1<sup>st</sup> wave of planes by and attack 2<sup>nd</sup> wave. Hide his reaction force, and counter attack once we're on ground. Moving his armor south,</p>

	using so they can't talk to each other.	Militarily we could still win, but politically?"	including some overlooking the airport.
Questions	P4	P5	
Key assumptions?	(1) Phase 1 (setting conditions by destroying the enemy's ARTY and ADA) will be successful  (2) SEALS will be successful.	(1) The #1 assumption ... SEALS were going to be successful in dealing with the hostage issue."  (2) Would not be a lot of enemy counter action. In particular, forces in north would not move south against landing.	
Were these assumptions important?	Yes	(1) Yes. Successfully freeing hostages his "2 <sup>nd</sup> center of gravity."  (2) Yes	
Were these assumptions reliable?	Yes. He has a contingency plan (using Apaches) if Phase 1 fails. But he had no contingency plan for the hostages. "I haven't planned for rescuing the hostages and SEALS."	(1) "I think it's fairly plausible if all the teams are under surveillance in some way." However, "in hindsight," may need more forces than SEALS and Delta Team to be successful. [Had Rangers as a reserve.]  (2) "... based on the morale issues ... knowing that they're going to be cut off, knowing that they're facing an overwhelming power, ... [they'll] stay in place	
Two different stories?	P4 didn't have a second story, either in terms of a friendly or enemy COA. However, in response to the question, he described "the most dangerous enemy COA." Specifically, it would be if the enemy had a lot of infantry hidden in the American compound and around the capital. It's most	P5 developed a 2 <sup>nd</sup> COA once he realized the island was smaller than he thought & that there was a third urban center (Nipponia), near pineapple plantation. This COA would be the same as the first except that it would (a) have Rangers (instead of 2-604 <sup>th</sup> BN) seize mine and	

	dangerous because it could thwart (or delay) mission accomplishment. It's possible because of the urban setting.	American compound, which still lets them help free hostages, & (b) has the 2-604 <sup>th</sup> BN attack and seize Nipponia and pineapple plantation.
--	--	---

Questions	P6	P7
Key assumptions?	Not answered. ("Evaluate" questions not on tape. Not sure if they were asked or not.)	<p>(1) "Enemy's armor forces in the north remain in the north or are correctly identified as being in the north; that they are not at the airfield. One ASU-85 or one BRDM can have a devastating effect on the initial jump. However, AC-130 will mitigate that, provided [the armor force] is not in a covered and concealed position."</p> <p>(2) "The only limitation of the AC-130 is that it has to be in a missile free environment. So, another assumption is that we take out the enemy's ADA; his SA-11s and SA-13s. Based on our experience in Kuwait and elsewhere, I don't think that's a bad assumption." [My note: What about the shoulder fired SA-14s?]</p> <p>(3) Note: Prior to answering this question, the participant said that he assumed that the SOF was successful in securing the hostages.]</p> <p>(4) Note: Prior to answering this question, the</p>

		<p>participant said that he assumed that the enemy will try to disable the airfield. So, the Rangers will airdrop a bulldozer (and operators) to clear any obstacles from the airfield before the MC-130s start landing.</p> <p>(5) When doing the Crystal Ball exercise, the participant said that he was assuming that HARM missiles were being used to destroy the SA-13 radar sites. This assumption was, in turn, based on the assumption that the SOF had secured the hostages because the HARM can provide collateral damage.</p>
Were these assumptions important?	Not answered. (Asked?)	Yes
Were these assumptions reliable?	Not answered. (Asked?)	Yes
Two different stories?	Not answered. (Asked?)	No



## STEP 2: PARTICIPANTS' ANSWERS TO THE TRAINING QUESTIONS

(Stop)

### Participant coding

P#1 = Participant #3 from Ft. Riley (May 1998)

P#2 = Participant #1 from Ft. Carson (July 1998)

P#3 = Participant #2 from Ft. Carson (July 1998)

P#4 = Participant #3 from Ft. Carson (July 1998)

P#5 = Participant #1 from Ft. Stewart (September 1998)

P#6 = Participant #2 from Ft. Stewart (September 1998)

P#7 = Participant #4 from Ft. Stewart (September 1998)

Questions	P1	P2	P3
How much time would you take if this were a real situation?	"With a full division staff, one could probably flesh-out the plan in 3 to 5 hours and, therefore, attack within 24 hours."	"If you have to start with nothing, then 2 to 3 hours, including the initial war game and, probably, the initial brief to the commander." This is based on the one-third to two-thirds rule; i.e., give 2/3 of time to subordinates for their planning. Also assuming the commander is involved with the estimate. "If most of staff has done their estimates, then might be able to do it in 1 hour or so."	I'd use the "1/3-2/3" rule. Since there is only 1 day prior to H-Hour, I'd take 8 hours to plan, and probably less.
Costs of delay?	(1) Gives the enemy time diplomatically (his legitimacy claim) (2) Allows him to try to use small boats and planes for re-supply.	(1) Enemy could kill hostages (2) Enemy could win politically (3) Enemy could build up forces (4) Enemy could dig in (5) Enemy could	"The enemy can't get reinforcements, but he can dig in and hide better."

	(3) Gives him time to dig in.	camouflage his forces (6) Enemy could move.	
Unresolved uncertainties when you start mission?	(1) Control of the hostages.	(2) "Would not be able to pinpoint all his forces, nor should we try. Focus on key terrain." (3) Not knowing what their ADA is.	(1) The enemy. [We would be able to resolve uncertainties about the tides and weather.] (2) Where all the hostages were.
Possible to resolve these uncertainties?	Not answered.	(1) Notes above that one should not try to pinpoint all enemy forces (2) Previously noted that could put someone on the ground to find out the type of ADA or use special aircraft packages to deal with it.	Not answered.
Potential costs of not resolving these uncertainties?	Not answered.	We could lose aircraft and "take severe casualties."	(1) Attacking a site with no hostages. (2) Attacking a C2 node that is a decoy. (3) Attacking more dug-in positions.
Which uncertainties could be resolved if you took more time?	Could improve his plan. For example, (1) Could better find the enemy's ADA with more time, and (2) Better use of his own air against enemy assets.	Did not answer, but it sounds like type of ADA.	

<b>Costs of delays vs. costs of errors?</b>	<b>Biggest potential error is that can't free hostages. If this happened, he'd continue mission without delay using contingency plan (Rangers and MEU)</b>	<b>"We want to strike when its dark and within 24 hours. So, we may not know their ADA. We put the best plan together that we can and then proceed."</b>	<b>Didn't answer question. Instead, P3 said, "The scenario was unrealistic in that I did it alone. I'd have a staff to help me. And that's how we did it at CGSC. Everyone had a job for every operation. And we rotated those jobs."</b>
---	--	--	---

<b>Questions</b>	<b>P4</b>	<b>P5</b>
<b>How much time would you take if this were a real situation?</b>	<b>"Three hours to develop and war game the COA, assuming had a real staff and that had to execute in 24 hours."</b>	<b>Didn't answer.</b>
<b>Costs of delay?</b>	<b>(1) Enemy would kill hostages.</b> <b>(2) Enemy would stir up the media.</b> <b>(3) Enemy would improve his defensive battle positions.</b>	<b>Didn't answer.</b>
<b>Unresolved uncertainties when you start mission?</b>	<b>(1) Success of SEAL teams.</b> <b>(2) Status of enemy ADA.</b>	<b>Status of hostages.</b>
<b>Possible to resolve these uncertainties?</b>	<b>"Hard because I don't own the assets."</b>	<b>Yes by using more troops</b>
<b>Potential costs of not resolving these uncertainties?</b>	<b>(1) Could loose Rangers to enemy ADA.</b> <b>(2) "Another thing that I didn't think about was mines in the harbor delaying the MEU."</b>	<b>Could become a "Somalia type" situation where loss of too many hostages brings everything to "a screeching halt."</b>
<b>Which uncertainties could be resolved if you took more time?</b>	<b>Didn't answer.</b>	<b>Didn't answer.</b>
<b>Costs of delays vs.</b>	<b>"Hard question to</b>	<b>Didn't answer.</b>

costs of errors?	answer because of the mission statement. Seems to me that we have a pretty good picture of the enemy" situation. So, get a plan and execute."	
------------------	---	--

Questions	P6	P7
How much time would you take if this were a real situation?	Not answered.	"... with the Haiti operation we were postured for one operation on Guantanamo, and were actually on the 53s in route for H-Hour targets, when we got RTBed because they had a diplomatic breakthrough. And less than 24 hours later, we were inserting forces (10 <sup>th</sup> Mountain Division) on a completely different plan. So, I don't think the Arisle scenario is unrealistic. Our army has a lot of flexibility. But a complex scenario like this, with inter-service coordination, I don't think it can be done in 24 hours. Thirty-six hours is probably not reasonable either. They went into compartment planning on the Grenada operation five days out, before they even began positioning forces."
Costs of delay?	Not answered.	See answer to last question below.
Unresolved uncertainties when you start mission?	Not answered.	Not answered separately. See answer to last question below.
Possible to resolve these uncertainties?	Not answered.	See answer to last question below.
Potential costs of not	Not answered.	See answer to last

resolving these uncertainties?	(Asked?)	question below.
Which uncertainties could be resolved if you took more time?	Not answered.	Not answered.
Costs of delays vs. costs of errors?	Not answered.	<p>"The cost of delay versus the cost of errors? If we seize on a COA and start developing a plan for that COA, then we can get the Warning Order to the forces so that they can start making their preparations. We want to give them as much time as we can. If you wait too long to decide on your COA, you don't have enough time to coordinate your fires or do your inter-service coordination. So it's critical that, in the absence of information, you make the assumptions and develop your COA. It may be an 80% solution, but an 80% solution violently executed is a lot better than a 100% solution that's late.</p> <p>The cost of errors is obviously high because, if the INTEL is lacking or the SA-13s don't get taken out, one missile can take down a C-130 with 65 airborne troops on it or an assault CP. So, you got to take the time to make sure the coordination is done to take out the critical targets.</p>

### **STEP 3: A MORE DETAILED LOOK AT HOW THREE PARTICIPANTS SOLVED THE ARISLE SCENARIO**

This brief report supplements the more quantitative analysis of how the participants answered the questions for each of the modules in the prototype training system. Its purpose is to provide a more detailed look at how three participants solved the Arisle scenario, with a particular focus on how the situation features and goals were interconnected in the recommended Course of Action.

Please keep these more general points in mind when reading the write up for each of the participants.

1. Different participants framed the mission differently by how they defined what "control of the island" meant. In particular, five of the nine participants (P#1, P#5, P#7, P#8, and P#9) defined "control of the island" as regaining control of the entire island and destroying the enemy force. The other four participants (P#2, P#3, P#4, and P#6) defined "control of the island" as controlling the southern portion of the island, which is where the capital, American compound, airport, Oregonium mine, and port were located. All participants emphasized destroying the enemy force along the central ridgeline and in the south.
2. The "situation goals" a participant identified in answer to our questions was directly tied to how they framed their mission. In fact, the goals are part of the frame.
3. One might also argue that the "situation features" also represent critical elements of the participants' frame. In particular, all seven participants considered in the quantitative analysis agreed that the following were key situation features during their mission analysis:
  - (a) Enemy force is spread out;
  - (b) Enemy's fire support (i.e., artillery) on the high ground;
  - (c) Enemy air defense assets;
  - (d) Enemy's command, control and communications; and
  - (e) The hostages
4. Each participant's COA was connected to their situation goals and interpretation of the situation features (those above and others); that is, how they framed the mission.
5. There was considerable agreement among the participants' COAs with respect to how they dealt with the above situation features, except for the hostage situation. For example, all seven participants tried to
  - (a) Move quickly and decisively by using simultaneous attacks against the spread-out enemy force;
  - (b) Eliminate a considerable portion of the enemy's fire support before (and shortly thereafter) inserting ground forces;
  - (c) Eliminate the enemy's ADA before inserting ground forces; and
  - (d) Eliminate (or use) the enemy's command and control.

6. Nevertheless, there were significant differences in the participants' COAs, depending how they framed the mission. As we've noted elsewhere, all participants who defined "control" as control of the entire island sent forces to either secure or seize Mar Blanche, the northern city of Arisle. None of the participants who defined "control" as control of the southern part of the island did so.

In addition, 3 of the 4 participants who defined "control" as control of the southern part only (i.e., P#2, P#4, and P#6), sent ground forces to seize the central and/or western mountains along the ridgeline as part of the initial attack. None of the five participants who defined "control" as regaining the entire island did so. This is probably because they all sent forces against Mar Blanche, and in two cases against enemy forces in the pineapple plantation of Nipponia (northwest part of island), as part of the initial attack instead.

7. Moreover, there were significant COA differences even among participants who framed the mission the same way. For example, P#2 and P#3 defined "control of the island" as control of the southern part of the island. Yet P#2 sent ground forces against enemy troops on the mountains; P#3 didn't. Also, P#2 did not seize the airport, which is what P#3 did. And although both had the MEU landing in the south, P#2 had them landing at the small beach below the American compound to secure it and the capital. In contrast, P#3 had the MEU landing at the beach below the mine to secure the mine; he let the air assault BNs secure the capital. **The point is that although both officers framed the mission the same way, had the same goals, focused on the same situation features, and tried to connect their COA to all of this, they recommended different COAs.** Since we have no way of knowing whether one COA is better than another, we simply assume that they represent different ways of achieving the same goals.
8. Identified information gaps or conflicts may or may not address what the participant considers to be a weakness in his COA. For example, "knowing enemy intent" is a repeatedly mentioned gap by P#1. But he admits that he really doesn't care that much about it because he's going to hit the enemy with air strikes and simultaneous attacks to overwhelm him, regardless of his intent. In contrast, extraction of the hostages (and the assumption that the SEALs can free them) is a gap he keeps trying to fill (i.e., act on) because he's going to continue the mission without delay.
9. All participants resolved goal conflicts in favor of mission accomplishment.
10. The participants had different perspectives on the secondary goals of freeing the hostages, minimizing casualties, and minimizing collateral damage. As we have mentioned elsewhere, all nine participants mentioned "freeing the hostages" as a concern, but only five of them (P#1, P#2, P#5, P#7 and P#9) seemed to have explicitly stated tasks for helping the SEALs do so. For example, P#5 and P#7 were the only participants who mentioned using the Delta Team, and they both had the Delta Team going in with the SEALs to free hostages. Also, P#1, P#2, and P#5 either gave the Rangers a "be prepared" task to free the hostages or were keeping them in reserve explicitly

for that purpose. P#9 discussed the possibility of "flexing a Ranger company" and using the MEU, which train for Non-combatant Evacuation operations (NEO) to help free hostages. P#7 and P#9 also emphasized the importance of establishing a SOC-C liaison or command element, respectively, to facilitate the coordination of the ground forces and the SEALs. It is interesting to note that 4 of the 5 participants who explicitly stated tasks for helping the SEALs defined "control" as regaining control of the entire island.

The other two secondary goals were not discussed explicitly by many of the participants. P#1, P#4, P#5, P#7 and P#9 explicitly discussed minimizing casualties at length. And P#1, P#7, and P#9 explicitly discussed minimizing collateral damage at length.

It is interesting to note that P#1, P#7, and P#9 seemed to emphasize all three secondary goals, as well as the mission. And P#5 emphasized two of them: freeing the hostages and minimizing casualties. All four participants (P#1, P#5, P#7 and P#9) defined "control" as regaining control of the entire island. We realize that our sample size is small, but we thought this was an interesting point to note here.

We now present a detailed look at how three participants (P#1, P#2, and P#3) tried to solve the Arisle scenario. These perspectives illustrate how they tried to think through the scenario; what aspects of their thinking were nicely tied together; and what aspects had holes and conflicts. We know of very few metacognitive analyses covering such a wide range of questions, particularly for very experienced officers who framed the problem differently. Therefore, we hope the reader finds the information below insightful.

#### I. Participant #1 (Ft. Riley)

- A. How Arisle mission was framed - The American center of gravity is not just the mine, but the whole perspective of how could Mainlandia have the audacity to do this. Given that, we want to take the entire island with as little collateral damage as possible.

P#1 struggled with the definition of what "control of the island" meant. He described "control" as defining the American center of gravity. He knew that the definition he decided on would determine his recommended COA. We quote, "If the center of gravity is just retaking the mine, then COA #1 is preferred. If the American center of gravity is getting the Mainlandian force off the entire island, then COA #2 is preferred." At this point, the participant went back to the written materials to see if he could figure out what the American center of gravity was. "Okay, here it is. This is what I was looking for. 'It is imperative that we not place interests before humanitarian concerns.' Go with COA#2; don't take the mine first."

#### B. Situation Goals [from Stories module]

- 1. Retake the island with as little collateral damage as possible

Early in the problem-solving situation (pg. 2 in Summary) the participant pointed out that, "... since most of the civilians live in the three cities, there



doesn't seem like there will be much collateral damage." He seldom discussed "collateral damage" thereafter.

2. Get on island as quickly as possible and defeat enemy until he's ready to surrender.
- C. Situation features that had the biggest effect on your course of action (COA)? [from Stories module]
1. The (small) size of the enemy force, and how spread out they were. For example, a river divides his forces.
    - (a) So, I wanted to hit him quickly in locations where his forces could not support each other.
    - (b) "Once the SEALs get the hostages out and our air strikes neutralize the artillery on the ridges, we can isolate his forces." [page 2 of Summary]
  2. My perception of the enemy's center of gravity. [Note: P#1 never discussed the enemy "center of gravity," just the American "center of gravity," which was described above in terms of how the problem was framed.]
- D. How were your COA events connected to your goals? P#1's recommended COA focused directly on achieving stated Goal #2, which was to get on the island as quickly as possible and defeat enemy until he's ready to surrender. This was basically how he framed the mission, in terms of "control of the island. His recommended COA used the above stated situation features to accomplish this goal.
1. Divided the enemy into four groups in order to obtain overwhelming force ratios. [Note: His COA comparison focused on ensuring favorable force ratios.]
    - (a) Enemy force in south
    - (b) Enemy force in north around Mar Blanche
    - (c) Enemy force in the pineapple plantation (at Nipponia) and at airport
    - (d) Enemy force in forest
  2. Then, I attacked simultaneously in three places so that enemy forces were not able to support each other
    - (a) Sent MEU against enemy force in south to secure mine and western mountain
    - (b) Sent 1<sup>st</sup> air assault battalion (BN), supported by attack helicopters, against Mar Blanche to destroy two enemy platoons and seal-off the city. Follow-on mission was to air assault to the central mountain to control it.
    - (c) Sent 2<sup>nd</sup> air assault BN, supported by the other attack helicopter squadron, against Nipponia. Follow-on mission was to drive down road to take airfield and American compound, and clear Beauqua (capital) of enemy.
    - (d) Note 1: First has the MEU look like they are going to land in the north around Mar Blanche. The purpose of this "feint" was to try to get the enemy's reserve out of position so that it couldn't react fast enough to the simultaneous attacks.

- (e) Note 2: Rangers were kept as a reserve. It was anticipated that they might need to help free the hostages. If they were not needed, then they would clear the enemy forces from the forest.

**E. "Stories"**

1. Considered the following stories as part of his analysis:
  - (a) Friendly Intent Story
  - (b) Mission Analysis
  - (c) Correlation of Forces: He did a systematic evaluation of the force ratios for the MEU, assault BNs, and Rangers to assess the feasibility of his COAs during COA comparison. In fact, one reason for his recommended COA was "better combat ratios."
  - (d) Action Execution
2. Enemy Intent Story? – No. P#1 pointed out that he didn't spend much time thinking about the enemy's goals.
3. Evidence Interpretation? – P#1 worried a lot about the enemy's shoulder-held SA-14s. However, he pointed out early in his deliberations that the friendly aircraft that was shot down was "painted by radar; therefore, it was probably not hit by an SA-14."

**F. "Identifying" Gaps [Note: Listed below in order listed by participant]**

1. Gap #1: What was the enemy's intent?
  - (a) Not part of P#1's story because he didn't think much about enemy goals
  - (b) However, he considered it important because he wants to destroy the enemy force
  - (c) He'd try to fill this and other gaps by using photo imagery and human intelligence, from the SEALs or guys on the ground. This is part of standard operating procedure (SOP).
    - (1) Other than that, he's dealing with this and other uncertainties by being proactive.
    - (2) He pointed out, however, that he's not going to try to predict enemy intent. He's going to hit the enemy with air strikes and three simultaneous attacks to overwhelm him, regardless of his intent.
2. Gap #2: What's the last piece of terrain the enemy wants to hold?
  - (a) Not part of his story either
  - (b) However, it's important for his goal of destroying the enemy force. He'd want to go after that terrain early.
  - (c) He'd use SOPs to try to fill the gap but, again, he's not worried about the enemy's intent because he plans to overwhelm the enemy's forces
3. Gap #3: Extraction of the hostages
  - (a) Not considered much in his story. He basically assumes that Special Operations can get the hostages out safely and before the attack begins.

- (b) However, he said that extraction of the hostages was an important (albeit secondary) goal, and he did give the Rangers a "be prepared" mission to help the SEALs if necessary.
- (c) Moreover, upon reflection, he said that he'd modify his COA enhance the safety of the hostages in two ways
  - (1) He'd create "no fire" areas until he knows the hostages have been released
  - (2) He'd begin thinking about how he might use the MEU, since Marines have special operations training

**G. "Deconflict"**

1. Example of conflicting information? The written materials lead you to believe that one of the big reasons the enemy wanted Arisle was the mine. But he didn't mass his forces to defend it (or the beach or airport) well. Does he think he has it covered with ARTY on hills or does he have a different intent or purpose for taking Arisle?
  - (a) The conflict is important for understanding enemy intent, and why they're in their current positions and what they're trying to protect.
  - (b) P#1 said that he'd try to resolve the conflict through diplomatic channels by trying to figure out the enemy's goals. What's he really after? Why is he there? [Note: His earlier answer suggests that, regardless of the enemy's goals and intent, he intends to overwhelm the enemy force militarily.]
2. Example of conflicting goals? Again, the conflict has to do with the enemy. He's trying to gain international legitimacy for his presence on Arisle, but he's threatening to kill the hostages. Killing the hostages will not gain him legitimacy, but international wrath.
  - (a) He doesn't address how he's going to learn more except, as stated above, diplomatically to figure out the enemy's goals
  - (b) Note: The participant made a point of emphasizing that he expects to achieve his goals. "By first freeing the hostages, and then going in quickly with minimal collateral damage, I meet my goals."
  - (c) "Evaluate"
1. "My biggest assumption is that Special Operations guys can get the hostages out."
  - (a) This assumption is critically important. "My goals are little collateral damage, get the hostages out safe, and destroy his force. I won't get the hostages out safe if I lead with gun ships, which my plan does, and the hostages are there. I won't accomplish my goals."
  - (b) This assumption is reliable
  - (c) How expand story (i.e., COA)?
    - (1) In addition to using the Rangers as a reserve for freeing the hostages, P#1 said he'd look into using the MEU's special operations capabilities

- (2) He'd create "no fire" zones around certain targets until he knows that the hostages have been released
  - (3) He also emphasized that he'd be trying to take away the enemy's command and control by destroying as much communications as possible, and jamming enemy frequencies so that they couldn't talk to each other
- 2. Second assumption: Assumed that MEU would have a Q-36 radar to figure out where the enemy's remaining artillery is firing from
- H. "Stop" [Note: Incorporated the answers to "Act" questions above]
  - 1. How much time would you take if this were a real situation? "With a full division staff, one could probably flesh-out the plan in 3 to 5 hours and, therefore, attack within 24 hours."
  - 2. Costs of delay?
    - (a) Gives the enemy time diplomatically (his legitimacy claim)
    - (b) Allows him to try to use small boats and planes to re-supply
    - (c) Gives him time to dig in
  - 3. Unresolved uncertainties when start mission? Control of the hostages
    - (a) Did not indicate if it was possible to resolve this uncertainty, but would certainly be trying to do so.
    - (b) Emphasized that his biggest potential error is not being able to free the hostages. However, he'd continue the mission without delay using his contingency plan (Rangers and MEU)
  - 4. Uncertainties that could be resolved if he took more time?
    - (a) Could better find the enemy ADA
    - (b) Better use his own air forces against enemy assets

## II. Participant #2 (Ft. Carson)

### A. How Arisle mission was framed

- 1. Eliminate the enemy's offensive capability, particularly his fire support along the ridgeline, and
- 2. Control the southern portion of the island (American Compound, Capital City, airport, and Oregonium mine)
- 3. P#2 makes the following point while developing his first COA: "Our primary mission is not to kill every bad guy. Our primary mission is to take back the island. ... The Task Force Commander has to tell me if I'm all screwed-up. If we eliminate the fire support here along the center area, if we retake and control the airport, the American compound, and the capital, so that we basically control the high ground and the southern half of the island – at that point, I think we can say that the island is secure. Obviously, once we would do that, we would immediately continue to into other (?) sites against the enemy. But, from my standpoint, ... we'd have eliminated the enemy's offensive capabilities and we'd control the southern half of the island."

4. P#2 immediately notes that "the hostages are a concern" and that he needs to back-up the SEALs
  - (a) Assumption: Hostages will be there when we attack; consequently, have Rangers help secure them.
  - (b) However, "Hostages are not a primary concern; it's the SEAL teams' mission."
- B. Situation Goals [from Stories module]
  1. To initially eliminate their ability to influence us, and
  2. Secure the island
- C. Situation features that had the biggest effect on your course of action (COA)? [from Stories module and Summary]
  1. "Key terrain," which P#2 defined as the "high ground" going west to east in the center of the island. [Note: Ridgeline and three mountains]
    - (a) The very first thing that P#2 does is look over the disposition of the enemy forces and availability of friendly assets. [Note: The second thing he did was define what "control of the island" meant.]
    - (b) Right away, P#2 points out that we need to suppress the enemy artillery (ARTY) fire on key terrain and eventually eliminate it.
    - (c) "The key to all this appears to be seizing the high ground and eliminating the reserve." Eliminate their fire support. They're so spread out, we can pretty much handle them. So, how to do that?"
  2. The second (and only other) situation feature that P#2 listed during the Stories module was the enemy's ability to influence friendly actions
    - (a) In addition to the fire support on high ground, P#2 lists the following enemy assets that can influence friendly actions prior to developing his COA
      - (1) One battery of 130s in Nipponia because of their range
      - (2) 5 Migs
      - (3) 6 HIND-B with a company of reserves in the vicinity of the central sector
      - (4) Enemy's ADA assets "dictates a coordinated SEAD [Suppress Enemy Air Defense] effort, both Air Force, Navy, and our internal assets." Also, air component commander would have to hit targets that could hit beaches.
    - (b) P#2 points out that the enemy's command and control was vulnerable, particularly given how dispersed the enemy was. So, "if can interrupt their C2, can have independent fights going on. If can cut-off the C2, then the 120s won't know what's going on and they'd be ineffective in supporting their troops."
    - (c) P#2 pointed out that the mine was not a critical player because there wasn't anything that the enemy could do to it that we couldn't fix. "We don't have to seize it."

**D. How were your COA events connected to your goals?**

1. With respect to Goal#1: Initially eliminating the enemy's ability to influence friendly actions
  - (a) As noted above, P#2 has a coordinated attack on the enemy's ADA using air force and navy assets. "Initially, the whole plan is the suppression of the ADA. We have to do that or the whole thing falls apart."

Note: P#2 also makes an explicit point of stating that he'd send the air force after the Migs.
  - (b) Then, launches three simultaneous attacks against enemy forces on each of the three mountains to eliminate their ability to influence friendly actions in the southern half of the island
    - (1) Supported by one of the two attack helicopter squadrons, the Rangers air drop on to the central mountain to eliminate enemy reserve, secure high ground, and eliminate enemy fire support. (Then, their "be prepared" mission was to help free the hostages.)
    - (2) Supported by naval gunfire, the 1<sup>st</sup> air assault BN parachutes in to seize the western mountain to take the high ground and to eliminate enemy fire support.
    - (3) 2<sup>nd</sup> air assault BN seizes the eastern mountain. (Note: Would be an air assault. There are only enough assault helicopters to take one squadron at a time. So, the 2<sup>nd</sup> BN uses them to seize the eastern mountain; the 1<sup>st</sup> BN has to parachute in to seize the western mountain.)
    - (4) While one attack helicopter squadron supports the Rangers, the other squadron attacks field ARTY in Nipponia, thereby eliminating its ability to influence US troops. This is all part of his plan to "isolate the fight in the south."
2. With respect to Goal #2: Securing the island
  - (a) Once the enemy's fire support is eliminated or suppressed along the high ground in the center and west, the MEU comes ashore at the small beach around the American Compound to secure it and the capital.
  - (b) It is important to note that the above, recommended COA was the second COA that P#2 developed. "COA #2 looks more like a Just Cause takedown where you're doing everything at once. COA #1 is less risky because have an uncommitted reserve (the 2-604<sup>th</sup> BN) that you can throw against anything that shows up. In COA #2, you don't have that much of a reserve; you're hitting everything at once. That gains you surprise, and probably overwhelms the enemy's ability to react to everything at once."
3. It is important to note that P#2 made a number of other goal-oriented points

- (a) Landing in the North is a possible COA, but he dismisses it immediately because "all of the vital assets are in the south." Vital assets include the airport, the American compound, the center of population (capital, power plant, water treatment plant), and the mine.
- (b) The enemy forces are already isolated. The key is to isolate them more as individual forces and kill them quickly; also, stop them from moving their forces. For example, once the 1-604<sup>th</sup> BN secured the western mountain, they'd move north into the pineapple plantation to defeat enemy there. We'd use company-wide patrols because against enemy platoons.
- (c) Consistent with his early assessment that the enemy's C2 was vulnerable, he went after the enemy's FM communications. He also launched a PSYOPS campaign and had people who spoke the enemy's language on their communication nets to call fire on their own units
- (d) If we loose the hostages, we still win the fight, but it's less of a victory for us. So, gave the Rangers a "be prepared" mission to help the SEALs

#### E. "Stories"

##### 1. Considered the following stories as part of his analysis:

- (a) Friendly Intent Story
- (b) Mission Analysis – "Yes, because it takes into account your mission, critical tasks, and essential tasks."
- (c) Correlation of Forces - "I did not necessarily look at a 3 to 1 ratio, although it turned out that I gave them that. I was assuming that our fire support would be a big factor."
- (d) Rate of Movement – Used it as another reason why forces should not land in the north; it would be too hard to get to the south through the teak forest
- (e) Principles of War – "undergird everything you do."
- (f) Action Execution – "It's good to look at this if you have some actions preceding your action. For example, you have to free the hostages before the main attack; the fire support has to be suppressed before the MEU goes ashore; the reserve needs to be killed early so that they can't reposition against the attack. The timeline sort of tells a story from an action standpoint. From H minus 2 when the hostages are released to H-hour when these actions occur. Here's why we do this first; here's why we do this second. So, if you want to call that a concept of operations or call that action execution, it's all the same."

##### 2. Stories that were not part of his analysis

- (a) Enemy Intent Story – P#2 pointed out that he didn't spend much time thinking about the enemy's goals. Later identified what he considered to be enemy's most dangerous COA. Specifically, they consolidate their forces in a central location with the hostages, and put-up a better integrated defense. They don't try to secure the entire island, but a piece of key terrain. For example, if they did that on the central mountain, we'd

have a hard time freeing the hostages. "Militarily we could still win, but politically?"

- (b) Evidence Interpretation – P#2 said that wasn't any. He never noted the conflicting information about the sophistication of the enemy's ADA

F. "Identifying" Gaps [Note: Listed below in order listed by participant]

1. The gaps
  - (a) Gap #1: Morale of enemy forces? Willing to fight to last man?
  - (b) Gap #2: Effectiveness of enemy's fire support? Their ability to put steel on target?
  - (c) Gap #3: Effectiveness of enemy ADA? Is there something I can do as a ground component commander to help our pilots?
  - (d) Gap #4: Need more information about friendly forces. I'm assuming that everything is 100%; for example, that morale is good, that the leaders are there, and that the maintenance is good.
  - (e) Gap #5: Assuming that we can go even if weather is bad. Also, P#2 noted that he didn't know when high tide was compared to 0300 H-Hour for the MEU to go ashore.
2. Gaps #2 (effectiveness of enemy fire support) and Gap #3 (effectiveness of enemy ADA) were the only gaps that were discussed during COA development. In fact, one of the reasons that P#2 decided on COA #2 was that it used the Apaches to attack the enemy ARTY in Nipponia.
3. We think that P#2 considered all the gaps important, but he only discussed why it was important to know more about the enemy's fire support
  - (a) Specifically, he said that the Rangers and assault BNs would take more casualties seizing the mountains, and the MEU coming ashore, if the enemy's fire support was more effective than we thought
  - (b) P#2's focused on the enemy's fire support from the beginning of the scenario. It is critically tied to his first goal, which was to eliminate the enemy's ability to influence friendly actions.
  - (c) P#2 only discussed how he'd fill the gap in information about the enemy's willingness to fight. Said he'd look at historical evidence regarding how the enemy has fought in the last ten years, and how successful they were. How has this paratroop unit been used in their home country? Is it an elite fighting force that is the vanguard of their military? I'm assuming they sent their best forces. How do they train? Have they been used in a police role or have they actually trained for combat? Would also use your real-time INTEL (SEALS, own recon. forces, airplanes, satellites, signal intercepts, human intelligence) to help assess their morale, weapons, locations. For example, are they in good defensive positions or are they open to air attack?

G. "Deconflict"

1. Example of conflicting information?



- (a) P#2 didn't identify any conflicting information. He said that he missed the conflict about the enemy's ADA being more sophisticated than we thought, but that it wouldn't matter. He said that if our SEAD were successful, the enemy's ADA would be suppressed regardless of type.
  - (b) How resolve conflict? Put someone on the ground to identify ADA weapon and/or use special aircraft packages, like Wild Weasel and Phantoms in Vietnam.
2. Example of conflicting goals?
- (a) The goal conflicts
    - (1) Goal Conflict #1: One goal, low casualties, argues for establishing a base and moving methodically from it. On the other hand, a second goal, the need to act quickly, argues for simultaneous attacks that may increase casualties.
    - (2) Goal Conflict #2: Doesn't want hostages killed, but doesn't want concerns about the hostages to hinder combat operations
  - (b) How did he resolve the goal conflicts?
    - (1) Methodical buildup would not achieve the mission, so he dismissed it.
    - (2) Achieving mission is most important goal, so it weighed more heavily than casualties, whether soldier or civilian
    - (3) Note: Both goal conflicts resolved in favor of mission success, which was defined as quickly eliminating the enemy on the ridge (and their ability to influence US forces) and securing the southern half of the island.

#### H. "Evaluate"

- 1. Key assumptions [listed below in order given by P#2]
  - (a) Everything is about 100% for friendly forces: morale good, leaders there, and maintenance good.
  - (b) We'll attack even if the weather is bad
  - (c) INTEL picture is fairly accurate
  - (d) SEAL teams will be successful
  - (e) Naval and air forces support will be successful. In particular, SEAD suppresses fire support and ADA to permit us to accomplish the mission.
  - (f) Rangers find a suitable drop zone near high ground, and there's no massacre coming down in parachutes
  - (g) Suitable landing zones for helicopters [Note: Air assault on eastern mountain.]
  - (h) Migs and HINDs (for moving reserves) mainly killed on ground
  - (i) We cut their communications
- 2. These assumptions are "very important." [It's important to note that he mentioned everyone of them before this question was asked.]

3. Assumptions are reliable
4. Two different stories? P#2 pointed out that assumptions about securing hostages probably would not hold for "the enemy's most dangerous COA;" consolidating on the central mountain with the hostages. "SEAL teams would have a very difficult time getting the hostages out, & they would be more in the direct fight. Militarily we could still win, but politically?"

I. "Stop" [Note: Incorporated the answers to "Act" questions above]

1. How much time would you take if this were a real situation? "If most of the staff has done their estimates, then might be able to do it in one hour or so. If you have to start with nothing, then I'd say closer to 2 to 3 hours, including the initial war game and, probably the initial brief to the commander."
2. Costs of delay?
  - (a) He could kill hostages
  - (b) He could win politically
  - (c) He could build up his forces
  - (d) He could dig in
  - (e) He could camouflage his forces
  - (f) He could move
3. Unresolved uncertainties when start mission?
  - (a) "We would not be able to pinpoint all of his forces, nor should we try. Focus on key terrain."
  - (b) Not knowing what their ADA is.
4. Cost of not resolving these uncertainties? If they have an ADA weapon that is effective against our aircraft, we could take severe casualties. At same time, we want to strike when it's dark and within the next 24 hours. So, we may not know their ADA. We put the best plan together that we can, and then proceed. [Note: This basically answers the trade-off question of cost of uncertainties versus cost of delay. Don't delay.]

III. Participant #3 (Ft. Carson)

- A. How Arisle mission was framed - Quickly insert and mass forces to surprise enemy and gain control of the southern portion of island as quickly as possible. Once south is controlled, including communications, it's just a matter of time before they surrender.
- B. Situation Goals [from Stories module]
  1. Quickly insert and mass forces on island to surprise enemy and gain control of southern portion of the island ASAP.
  2. Use air power to remove enemy's ability to counter first goal
  3. Use following principles of war: mass, surprise, and economy of force
- C. Situation features that had the biggest effect on your course of action (COA)? [as listed from Stories module and Summary]

1. The northern terrain, particularly the teak forest, is not good area for either an air or land assault.
2. The high ground in the center because he has anti-tank and artillery assets there. "This affects my COA. I have to make sure to get in counter-battery assets (Q-36s) early to detect them."
3. "Places for landing assault. I did not want to be near populated areas (e.g., Beauqua or Mar Blanche)."
4. Prior to COA development, P#3 pointed out that "the enemy's center of gravity is being able to communicate with all his forces. So, he wants to knock out the enemy's communications so that he can not talk to his forces. If that's done, the enemy won't have a unified force to bring action against us. Wants to target the command and control locations, and identifies them on the map. Also, participant wants to target whatever else the SEALs identify as main communications. Before the initial assault, wants all these sites jammed."

D. How were your COA events connected to your goals?

1. With respect to Goal#2 (using air power to counter enemy's ability to stop the friendly force from quickly inserting and massing forces to control the southern half of Arisle), P#3 has the air forces doing the following before the battle

- (a) Targeting the command and control sites so that the enemy can't communicate
- (b) Taking out the enemy ADA and artillery sites so that they can't affect the Rangers or MEU

He also wants the air force to target the radar for the enemy's counter-battery artillery, but he's not sure that they can do so effectively based on what he read in the handout. "If the air force can do it, let them. Otherwise, he's going to airlift in Q-36s."

Using the AC-130s to take out the HINDs so that the enemy's mobile reserve can't move quickly

2. With respect to Goal #1 (quickly insert and mass forces on island to surprise enemy and gain control of southern portion of the island ASAP) and Goal #3 (use principles of war: mass, surprise, and economy of force)
  - (a) Has two simultaneous so that the enemy is not sure where we're coming
    - (1) Supported by attack helicopters and naval gunfire, the Rangers seize the airport
    - (2) Supported by their internal air support, the MEU lands at the beach in front of the mine to control it. [Note: The location of this landing is away from populated areas and, therefore, minimizes collateral damage.]

- (b) Once the airport is secure,
    - (1) The two air assault BNs come into the airport (one at a time) to retake the capital city (Beauqua) and eliminate enemy communications capabilities. (Attack helicopters now provide fire support for air assault BNs.)
    - (2) The three friendly forces (Rangers, MEU, and air assault BNs) link up to secure southern half of island
  - (c) Note: In contrast to P#2, who framed "control of the island" and basically had the same goals, P#3 did not send any troops against enemy forces on the mountains, which is what P#2 did. Also, P#2 did not seize the airport, which is what P#3 did. And although both had the MEU landing in the south, P#2 had them landing at the small beach below the American compound to secure it and the capital. In contrast, P#3 had the MEU landing at the beach below the mine to secure the mine; he let the air assault BNs secure the capital. **The point is that although both officers framed the mission the same way, had the same goals, focused on the same situation features, and tried to connect their COA to all of this, they recommended different COAs.**
3. It is important to note that P#2 made a number of other goal-oriented points
- (a) With respect to freeing the hostages
    - (1) Prior to COA development, we became clear to P#3 that there are not enough SEALs to free all the hostages
    - (2) Would have SEALs free hostages in the American compound and Beauqua first in order to help reestablish unity and order in the southern half of the island.
      - a. He assumes that the SEALs can free these hostages before the Rangers and MEU land.
      - b. He has no contingency plan for helping them. For example, he said that he didn't think that air assault forces should go after individual hostage sites.
      - c. He knew that there was a problem in freeing the hostages in the north because the SEALs didn't have enough assets
    - (3) Once we had control of the southern half of the island, he'd start negotiating with the NOCLAS to free the remainder of the hostages. If negotiations failed, then he'd send out special teams to help free the remaining hostages.
  - (b) P#3 said that he did not want to go after other enemy troops. "Once we have control of the southern-half of the island, including communications, it's just a matter of time before they surrender."

- (c) P#3 noted that he might request that H-Hour be moved-up so we can "maximize the hours of darkness" because the enemy doesn't have a night-fighting capability. "Attacking at night is a major advantage for us." This is consistent with his goal of quickly inserting and massing forces. However, he realized he might not be able to have H-Hour moved up because the SEALs may need the time.
  - (d) He wants our naval forces to stop any Manlandia forces from interfering, and provide naval gunfire and air-support to ground forces.
- 4. Reasons he identified as "for your COA"
  - (a) Quickly puts maximum combat power on the island at a given time.
  - (b) Doing it at night
  - (c) Good INTEL, so we know where his forces and ADA are
  - (d) Concentrated my combat power to exploit fact that enemy is spread out across island
- 5. Reasons he identified as "against your COA"
  - (a) Enemy more familiar with the terrain because he's there
  - (b) P#3 doesn't know the capability of his 105<sup>th</sup> Air Assault Unit
  - (c) Weather is hot and humid; probably against my forces
- E. "Stories"
  - 1. Considered the following stories as part of his analysis:
    - (a) Friendly Intent Story – To go in and reestablish order in the south and progress from there
    - (b) Mission Analysis – P#3 did three things during his mission analysis
      - (1) First, looked at where the enemy was, what his capabilities and communications were, and what he believed his intent to be
      - (2) Then, he looked at his combat power, combat ratios, the terrain, and where he could attack
      - (3) Part of his guidance was that he had to act within 24 hours because of diplomatic activity
    - (c) Correlation of Forces Story – "Yes, I looked at the force ratios, particularly our superiority in air assets. That was part of the plan; to bring air assets in first and knock out key targets before ground forces came in. Also looked at naval assets."
    - (d) Principles of War – Listed the following principles of war as his third goal: mass, surprise, and economy of force
    - (e) Action Execution – Sequencing and timing was critical to his COA
    - (f) Other Stories – he mentioned the diplomatic aspects of the situation, which he covered under his Friendly Intent story, and the importance of the media, which he did not discuss earlier
  - 2. P#3 did not consider the following stories

- (a) Enemy Intent - "I'm not sure that my story had an enemy intent story. I think I know what he wanted to do. His intent was to try to protect every place on the island. I didn't think he could do that. ... I don't think I had a good feel for what the enemy was really capable of doing. He had his armor vehicles spread-out pretty much in the north. In the south, his forces were divided-up into three separate areas, and he was not concentrating his effort. But, I wish I had a better read."
- (b) Rate of Movement - "I did not really look at rate of movement as much as I probably should have. For example, how fast to fly from one place to another or move from one place to another on ground, or how long it would take the MEU to float over to there. Would do these things with a staff."
- (c) Evidence Interpretation

F. "Identifying" Gaps [Note: Listed below in order listed by participant]

- 1. The gaps
  - (a) Gap #1: About enemy. The more you know, the better.
  - (b) Gap #2: The media
  - (c) Gap #3: The different avenues for diplomatic negotiation. At division level, you need to know what's going on two levels up.
  - (d) Gap #4: "Small stuff," like tides and weather.
  - (e) Gap #5: Ramifications of attacking island. Anyone coming to their aid?
  - (f) Gap #6: If Japanese, Canadian, and Australian citizens on island. Are these countries going to assist us?
  - (g) Gap #7: If all the hostages are American. He has assumed so.
  - (h) Gap #8: Needs more information about the terrorists. Where they are; what their actions and reactions might be in different situations; if they held hostages before, and how it turned out.
  - (i) Gap #9: What are the Rules of Engagement? They have not been specified.
- 2. Where these events in your story? He said, "Some were and some weren't," but examination of the Summary indicates that only consideration of the enemy and hostages were in his story. Interestingly, this question caused him to identify other gaps
  - (a) We'd like more info about the mine (and area around it) before amphibious assault.
  - (b) Refugees from island? They could interfere with SEAD, and need to pick them up from sinking boats.
  - (c) Admitted he had not thought about enemy's most dangerous COA before question was asked. Thought our INTEL was good, and that enemy didn't have capability to do deception.
- 3. Why are the gaps important? He only addressed the media and enemy

(a) Thought media gap was critical to fill because he has to know how to deal with the media. "I should have considered [it] because it's critical to achieving my goal."

(b) Knowing more about the enemy (METT-T) important.

#### G. Deconflict

##### 1. Examples of conflicting information?

(a) Did not identify any

(b) When asked if he had noticed the conflict regarding the sophistication of the enemy's ADA, he said that he noticed it. However, he didn't give it much thought because he thought we'd be able to knock it out anyway with our air superiority.

##### 2. Examples of conflicting goals?

(a) When asked if he felt conflict between diplomatic and military situation, he said that he felt pushed to a military operation, similar to Haiti

(b) When asked if he felt any conflict between the military goals and not having any hostages killed, he said that he considered the latter unrealistic because the formal government does not control hostages. [In his COA, he only tried to save hostages in south.]

#### H. Evaluate

##### 1. Key assumptions

(a) First assumption was that I had to do a military operation because of the political situation. Diplomatic negotiations would not work or would not end in time.

(b) Enemy was not a sizable or capable force

(c) Enemy had a C2 conflict between his ground forces and the NOCLAS controlling the hostages

(d) Neither the pineapple plantation nor the teak forest was good for operations

(e) Weather would be cooperative

##### 2. P#3 thought all the above assumptions were plausible

3. Most dangerous enemy COA would be concentrating his force overlooking the airport. Keep ADA in camouflage. Let first wave of American planes by and attack the second wave. Also, hide his reaction force and, then, counter attack once we're on the ground. Also, move his armor forces south, including some overlooking the airport.

#### I. Act

##### 1. P#3 would take the following actions to fill in gaps

(a) Constantly update his information about the enemy, including the use of national intelligence assets to learn about the NOCLAS

(b) He'd stay in touch with the G-5 (Public Affairs Officer) to get updates on the media

2. Neither of these actions was in his story, but they seem like part of standard operating procedures.
3. What actions did you take to reduce your uncertainty? Answer:
  - (a) Used AC-130s in the north to knock out the enemy's mobile reaction force to prevent a counter attack
  - (b) Used initial air attacks to knock out the enemy's ADA and C2 nodes

J. Stop

1. "I'd use the "1/3-2/3" rule. Since there is only one day prior to H-Hour, I'd take 8 hours to plan, and probably less."
2. Cost of delay? "The enemy can't get reinforcements, but he can dig in and hide better."
3. Unresolved uncertainties when the mission started?
  - (a) The enemy
  - (b) Where all the hostages were
4. Potential costs of not resolving these uncertainties?
  - (a) Attacking more dug-in positions
  - (b) Attacking a C2 node that is a decoy
  - (c) Attacking a site with no hostages



### **STEP 3: SIMILARITIES AND DIFFERENCES IN HOW PARTICIPANTS FRAMED THE ARISLE SCENARIO AND THE COURSES OF ACTION (COAS) THEY DEVELOPED TO SOLVE IT**

One of the key uncertainties in the Arisle scenario is how the participants framed their mission in terms of what "control of the island" meant. We have typed summaries for the following nine officers who participated in our interview beginning at Ft. Bragg in March 1998 and concluding at Ft. Stewart in September 1998:

- P#1 = Participant #3 from Ft. Riley (May 1998)
- P#2 = Participant #1 from Ft. Carson (July 1998)
- P#3 = Participant #2 from Ft. Carson (July 1998)
- P#4 = Participant #3 from Ft. Carson (July 1998)
- P#5 = Participant #1 from Ft. Stewart (September 1998)
- P#6 = Participant #2 from Ft. Stewart (September 1998)
- P#7 = Participant #4 from Ft. Stewart (September 1998)
- P#8 = Participant #4 from Ft. Bragg (March 1998)
- P#9 = Participant #5 from Ft. Bragg (March 1998)

Five of the nine participants (P#1, P#5, P#7, P#8, and P#9) defined "control of the island" as regaining control of the entire island and destroying the enemy force. The other four participants (P#2, P#3, P#4, and P#6) defined "control of the island" as controlling the southern portion of the island, which is where the capital, American compound, airport, Oregonium mine, and port were located. All participants emphasized destroying the enemy force along the central ridgeline and in the south.

It is interesting to note that all three participants from Ft. Carson defined "control" as regaining control only of the southern portion of the island. Both Ft. Bragg participants defined "control" as regaining control of the entire island. Obviously, this is a very small sample. However, we might want to look at the biographical information for these (and other) participants, particularly their areas of specialization, to see if there is a systematic cause for this finding. We might also want to look at the solutions for the other three participants from Ft. Bragg, which time and resources do not permit us to formally summarize, to see if they also defined "control" as control of the entire island. The only other Ft. Carson participant did not have time to do the scenario.

Because of their different definitions of "control," the COAs for these two groups differ almost by definition, so to speak. All participants who defined "control" as control of the entire island sent forces to either secure or seize Mar Blanche, the northern city of Arisle. None of the participants who defined "control" as control of the southern part of the island did so.

There were other differences in the COAs developed by the two groups. The most notable one was that 3 of the 4 participants who defined "control" as control of the southern part only (i.e., P#2, P#4, and P#6), sent ground forces to seize the central and/or western mountains along the ridgeline as part of the initial attack. None of the five participants who defined "control" as regaining the entire island did so. This is probably because they all sent forces against Mar Blanche, and in two cases against enemy forces

in the pineapple plantation of Nipponia (northwest part of island), as part of the initial attack instead.

There were three secondary goals to the mission goal of "controlling the island:"

- Safely freeing the hostages;
- Minimizing casualties; and
- Minimizing collateral damage.

All nine participants mentioned "freeing the hostages" as a concern, but only five of them (P#1, P#2, P#5, P#7 and P#9) seemed to have explicitly stated tasks for helping the SEALs do so. For example, P#5 and P#7 were the only participants who mentioned using the Delta Team, and they both had the Delta Team going in with the SEALs to free hostages. Also, P#1, P#2, and P#5 either gave the Rangers a "be prepared" task to free the hostages or were keeping them in reserve explicitly for that purpose. P#9 discussed the possibility of "flexing a Ranger company" and using the MEU, which train for Non-combatant Evacuation operations (NEO) to help free hostages. P#9 also emphasized the importance of establishing a SOC-C command element to facilitate the coordination of the ground forces and the SEALs. It is interesting to note that 4 of the 5 participants who explicitly stated tasks for helping the SEALs defined "control" as regaining control of the entire island.

The other two secondary goals were not discussed explicitly by many of the participants. P#1, P#4, P#5, P#7 and P#9 explicitly discussed minimizing casualties at length. And P#1, P#7, and P#9 explicitly discussed minimizing collateral damage at length.

It is interesting to note that P#1, P#7, and P#9 seemed to emphasize all three secondary goals, as well as the mission. And P#5 emphasized two of them: freeing the hostages and minimizing casualties. All four participants (P#1, P#5, P#7 and P#9) defined "control" as regaining control of the entire island. I realize that our sample size is small, but I thought this was an interesting point to note here.

I also thought it was interesting that only 4 of the 9 participants (i.e., P#1, P#3, P#7, and P#9) generated and evaluated 2 COAs. One of the four (P#7) refused to say which one he'd select; he said he'd send both of them to the Plans shop for further development. (Note: I described the first one he developed in my Step 1 summary and below.) The other three participants selected the second COA that they developed as their "recommended COA." Three of these four participants (i.e., P#1, P#7, and P#9) defined "control" as regaining control of the entire island. One of them (P#3) defined it as regaining control of the southern part only.

I will describe in their words as much as possible, how each participant defined "control" in the next section of this report. Then, I will provide a brief summary of each participant's recommended COA in the last section. The reason for doing so in both cases is to facilitate further consideration of the similarities and differences in the participants' solutions to the Arisle scenario.

When considering the COAs, keep in mind the following summary points:

- All 9 participants "set the conditions" for the attack by trying to destroy enemy artillery (ARTY) and air defense assets (ADA) along the central ridgeline (and in the south) before using ground forces. All of the participants

except P#6 had the air force taking the lead in this activity. P#6 used naval gunfire instead, and basically saw no mission for the air force.

- 8 of the 9 participants (P#1, P#2, P#3, P#4, P#5, P#6, P#7, and P#8) used two or three simultaneous, initial attacks in different places. The other participant (P#9) had near simultaneity, where shortly after both assault battalions attack Mar Blanche, he has "on order" the Rangers seize the airport and then, "on order" the MEU land in the south.
  - 4 of the 8 (P#3, P#5, P#7, P#8) seized the airport in the initial waves of attacks, and
  - 5 of the 8 (P#1, P#3, P#6, P#7, and P#8) had the MEU land in the south.
- 8 of the 9 participants had the MEU land in one of three areas in the south. Only P#5 had the Marines land at Mar Blanche in the north. The other 4 participants (P#2, P#3, P#8, P#9) who attacked Mar Blanche all used one (or two) air assault battalions.
- 8 of the 9 participants seized the airport. Four of the eight (P#3, P#7, P#8, and P#9), including the two participants from Ft. Bragg (i.e., P#8 and P#9), used the Rangers. Three of the others used an assault battalion (P#1, P#5, and P#6), and one (P#4) used the MEU. P#2 did not go after the airport, saying that it was not needed for staging and could easily be taken later.
- 4 of the 9 participants (P#3, P#7, P#8, P#9) used the combination of having the Rangers seize the airport and the MEU land in the south.
- P#1 and P#4 were the only participants to use an explicit deception plan. In both cases, they had the MEU feint where it was going to land.
- Only P#3 and P#7 explicitly discussed the AC-130s. P#3 used them to destroy the enemy HINDs so that the enemy's mobile (air assault) reserve couldn't move quickly. P#7 used the AC-130s to support the Rangers' seizure of the airport and, then, one of the air assault battalions. I assumed that the other participants (except P#6) would have used them as part of the air force units trying to eliminate enemy ARTY, but that might not be a good assumption.
- When used, attack helicopters and naval gunfire were used differently by different participants. Consequently, how both were used will be described within the context of each participant's recommended COA.
- Five of the nine participants (P#2, P#4, P#5, P#7, and P#9) explicitly described how they would use Psychological Operations (PSYOPS) to inform civilians (P#9), get the enemy to surrender (P#2, P#4, P#7, and P#9) and/or free hostages (P#5).

We now turn to listing how "control" was defined and, then, summarizing each participant's recommended COA.

I. How "control" was defined

A. Defined "control" as regaining control of the entire island

1. P#1 - The American center of gravity is not just the mine, but the whole perspective of how could Mainlandia have the audacity to do this. Given

that, we want to take the entire island with as little collateral damage as possible.

[Note: P#1 struggled with the definition of "control," which he described as defining the American center of gravity. He knew that the definition he decided on would determine his recommended COA. We quote, "If the center of gravity is just retaking the mine, then COA #1 is preferred. If the American center of gravity is getting the Mainlandian force off the entire island, then COA #2 is preferred." At this point, the participant went back to the written materials to see if he could figure out what the American center of gravity was. "Okay, here it is. This is what I was looking for. 'It is imperative that we not place interests before humanitarian concerns.' Go with COA#2; don't take the mine first."]

2. P#5 - First center of gravity, and most important goal, is to control island within 48 hours. Control is defined as seizing urban centers in the north and south, the airport, American Compound, capital, port, & mine. (After that, can mop up enemy troops.) Second center of gravity is the media. So, the next goal is freeing the hostages.
  3. P#7 - Destroy the enemy and regain control of the entire island as quickly as possible. This intent included minimizing casualties and ensuring the safety of the hostages.
  4. P#8 - To seize Arisle by deadline and to secure hostages where possible (within mission parameters)
  5. P#9 - Seize Arisle no later than 2403 March to deny Mainlandian forces opportunity to gain international backing. ("Seize" means control of island & destruction of enemy force, or their withdrawal or surrender.)
- B. Defined "control" as controlling the southern part of the island
5. P#2 - (1) Eliminate the enemy's offensive capability, particularly his fire support along the ridgeline and (2) control the southern portion of the island (American Compound, Capital City, airport, and Oregonium mine).
  6. P#3 - Quickly insert and mass forces to surprise enemy and gain control of the southern portion of island as quickly as possible. Once south is controlled, including communications, it's just a matter of time before they surrender.
  7. P#4 - Destroy the enemy's strength, which is his ARTY, and seize the political center of gravity, which is the capital and airport. (Control southern half of island, including key terrain in center, Mt. Kohne, with minimal casualties.) "I get that, and the SEALs get the hostages, then the enemy is not going to be successful."
  8. P#6 - Wants to secure the southern part of the island to show that America is intent on securing Arisle, and to remove the enemy's legitimacy for being there. And, then, he'll proceed from there. So, his objective is to get a foothold on the island, and then eliminate the enemy force systematically. ("The enemy is not the objective.")

## II. Recommended COAs

A. For participants who defined "control" as regaining control of the entire island

1. P#1

- (a) First, does a deception. Shows the amphibious, MEU force north of Mar Blanche. This is a feint; P#1 does not want to land them there.
- (b) Then, simultaneously,
  - (1) Both air assault battalions attack in north
    - a. 1<sup>st</sup> BN, supported by attack helicopters, lands east of Mar Blanche to destroy 2 enemy platoons and seal off city.
    - b. 2<sup>nd</sup> BN, supported by the other attack helicopter squadron, lands and secures Nipponia (pineapple plantation) in northwest
  - (2) MEU lands at beach south of Oregonium mine and proceeds to take the mine and western mountain. (Note: All nine participants pointed out that the MEU has its own fixed-wing and rotary-wing attack assets, so they are not considered separately below.)
- (c) Then, as follow-on missions
  - (1) 1<sup>st</sup> BN leaves Mar Blanche and air assaults to central mountain to control it
  - (2) 2<sup>nd</sup> air assault BN drives down road from Nipponia to take airfield and, then, the American Compound and clear Beauqua (capital) of enemy troops.
- (d) Rangers have been held as a reserve. After completion of three initial simultaneous attacks, the Rangers will clear the enemy from the teak forest if they are not needed elsewhere. (Note: One reason kept as a reserve was if they had to help SEALs free hostages.)
- (e) Participant did not explicitly mention use of AC-130s or naval gunfire
- (f) How handled hostage situation?
  - (1) Keeps the Rangers as a reserve to help SEALs, if needed.
  - (2) Never mentioned the use of PSYOPS

2. P#5

- (a) Simultaneously (although not emphasized in transcripts)
  - (1) 1<sup>st</sup> air assault BN, supported by an attack helicopter squadron, seizes airport and control of major road intersection north of capital
  - (2) MEU seizes Mar Blanche in north, and the beach, bridge, and road network over river running north to south on the island.
- (b) 2<sup>nd</sup> air assault BN secures southern portion of island, including capital, American Compound, mine, and port. [Note: P#5 did not say if 2<sup>nd</sup> BN came in with the 1<sup>st</sup> when seizing the airport or if they came in later.]
- (c) Rangers initially held as a reserve to help rescue hostages. Later, during Phase 2, Rangers would clear enemy troops off the ridgeline and out of the teak forest if they don't surrender.

- (d) One attack helicopter squadron attacked enemy ARTY along ridgeline; the other supported the 1<sup>st</sup> air assault BN seizing the airport.
- (e) Naval gunfire is used to support MEU in north and throughout the region, particularly ADA suppression along ridgeline and at port.
- (f) How handled hostage situation?
  - (1) Explicitly uses the Delta Team to free hostages in the American Compound and adjacent areas
  - (2) SEALs free as many other hostages as possible elsewhere
  - (3) Rangers are held in reserve to help free hostages
  - (4) Had PSYOPS teams communicate with the enemy through the enemy's C2 in an effort to try to influence some of the NOCLAS not to harm the hostages.

3. P#7

- (a) Simultaneously,
  - (1) Rangers seize airport
  - (2) MEU lands in south to secure southwest part of island
  - (3) 1<sup>st</sup> air assault BN seizes beachhead at Mar Blanche
- (b) Then,
  - (1) Rangers leave airport to seize pineapple plantation in Nipponia and, then, clear in sector to the northwest
  - (2) MEU clears southwestern sector, including seizure of western mountain
  - (3) 1<sup>st</sup> air assault BN clears in sector to destroy the enemy on the eastern side of the island, including seizure of the eastern mountain
  - (4) 2<sup>nd</sup> air assault BN lands at airport with responsibility for clearing entire sector east of the MEU and west of 1<sup>st</sup> BN, including securing the capital and American Compound.
- (c) 1 helicopter attack squadron hits "parked targets" (ARTY and ADA?) on western and central ridgeline. Second helicopter attack squadron hits targets on eastern ridge and in Nipponia.
- (d) Initially, AC-130s support Rangers seizing the airport. Then, they support the 1<sup>st</sup> air assault BN in north.
- (e) How handled hostage situation?
  - (1) Talks about the importance of a Special Forces liaison team to ensure coordination with the SOC plan
  - (2) Has the Delta Team helping the SEALs
  - (3) Explicitly discusses the use of EF-111s to jam enemy communications in order to prevent the NOCLAS from finding out about the attacks and killing hostages

- (4) Has small PSYOPS teams with Rangers, but didn't say if they were to get the NOCLAS to free the hostages or get the enemy ground forces to surrender

4. P#8

- (a) Simultaneously,
  - (1) Rangers seize airport
  - (2) MEU lands at beach below mine to seize the mine and destroy enemy force in zone.
  - (3) 1<sup>st</sup> air assault BN lands at beach northeast of Mar Blanche to gain control of the highway and destroy enemy in northeast
  - (4) 2<sup>nd</sup> air assault BN lands in north too to seize Nipponia and isolate it
- (b) Then, Rangers (from airport, north of capital) and MEU (from mine, southwest of capital) seize capital and American Compound
- (c) Attack helicopters attack enemy ARTY on ridgeline and BN headquarters near capital
- (d) Did not mention use of naval gunfire
- (e) How handled hostage situation?
  - (1) Thinks there will be significant civilian casualties, but does not develop a contingency plan for helping the SEALs.
  - (2) Did not mention the use of PSYOPS

5. P#9

- (a) First, both air assault battalions secure Mar Blanche to control access to it. (They are the supporting effort. Their purpose is to protect the northern flank of the main effort in south.)
- (b) Then, on order, Rangers seize airport. (They are the initial main effort, before the MEU lands.)
- (c) Then, MEU conducts an amphibious assault on the far southwestern beach and proceeds to destroy the enemy force in zone, moving from west to east. They are the main effort.
- (d) Note: The first three actions are nearly simultaneous.
- (e) Then, on order, the Rangers proceed to secure the capital. Order probably given shortly after MEU lands.
- (f) Attack helicopter squadrons support the assault BNs securing Mar Blanche initially and, then, go after enemy armor assets once those assets start moving, presumably south.
- (g) Naval gunfire is first supporting the air force's efforts to destroy enemy ARTY, ADA, and C2; then, it supports the air assault BNs in the north; and then it supports the MEU.
- (h) How handled the hostage situation?
  - (1) Discussed the possibility of "flexing a Ranger company" and using the MEU, which train for Non-combatant Evacuation operations (NEO) to help free hostages.

- (2) Also emphasized the importance of establishing a SOC-C command element to facilitate the coordination of the ground forces and the SEALs.
  - (3) Mentioned a PSYOPS campaign, but not for freeing the hostages. Instead, it was oriented to telling enemy troops to surrender and civilians that the US troops were here to help them.
- B. For participants who defined "control" as regaining control of the southern part of the island only
- 1. P#2
    - (a) Simultaneously,
      - (5) Supported by one of the two attack helicopter squadrons, the Rangers air drop on to the central mountain to eliminate enemy reserve, secure high ground, and eliminate enemy fire support. (Then, their "be prepared" mission was to help free the hostages.)
      - (6) Supported by naval gunfire, the 1<sup>st</sup> air assault BN parachutes in to seize the western mountain to take the high ground and to eliminate enemy fire support.
      - (7) 2<sup>nd</sup> air assault BN seizes the eastern mountain. (Note: Would be an air assault. There are only enough assault helicopters to take one squadron at a time. So, the 2<sup>nd</sup> BN uses them to seize the eastern mountain; the 1<sup>st</sup> BN has to parachute in to seize the western mountain.)
    - (b) Once the enemy's fire support is eliminated or suppressed along the high ground in the center and west, the MEU comes ashore at small beach around the American Compound to secure it and the capital.
    - (c) While one attack helicopter squadron supports the Rangers, the other squadron attacks field ARTY in Nipponia, thereby eliminating its ability to influence US troops.
    - (d) How handled hostage situation?
      - (1) Rangers had an explicit "be prepared" mission to help the SEALs
      - (2) Planned to use PSYOPS, but it was focused on trying to get enemy troops to surrender, not freeing the hostages
  - 2. P#3
    - (a) Simultaneously
      - (1) Rangers seize airport
      - (2) MEU lands at beach in front of Oregonium mine to control mine.
    - (b) Then,
      - (1) Once the airport is secure, both air assault BNs land at the airport (one at a time) and proceed to retake the capital city (Beauqua) and eliminate enemy communications capabilities



- (2) MEU links up with Rangers and air assault battalions to secure southern half of the mountains. (Note: Participant did not provide more details; for example, with respect to taking mountains.)
  - (c) Attack helicopter squadrons initially support Rangers' seizure of airport, and then the air assault BNs seizure of the capital.
  - (d) Naval gunfire initially supports Rangers and then used to help destroy the enemy's counter-battery field artillery
  - (e) How handled the hostage situation?
    - (1) Only has SEALs free hostages in the American Compound and capital because he feels SEALs don't have enough assets to free hostages in the north
    - (2) After securing the southern half of the island, he would begin negotiating with the NOCLAS to free hostages. If that failed, he'd send out special teams to free them. [Did not mention "PSYOPS" by name.]
3. P#4
- (a) Started off with a deception plan. Specifically, he had MEU helicopters circling near the eastern mountain while naval gunfire fired at enemy positions on and near it.
  - (b) Then, simultaneously,
    - (1) Rangers air assault to destroy the 3 ARTY batteries on center ridge near the central mountain, Mt. Kohne. This will prevent indirect fire on MEU. If enemy's mobile reserve is not moving east, Rangers will handle them. (Movement would be because of MEU's deception).
    - (2) Both BNs' first task is to seize central mountain, which is the key terrain on the island. The second task is to destroy the MLRS batteries and fix the enemy infantry there so that they can't counterattack successfully. (Note: Later, both battalions would be used to take western & eastern mountains if PSYOPS doesn't get enemy troops there to surrender.)
  - (c) Then, as soon as air assault battalions take out MLRS batteries, MEU lands at beach near American Compound and proceeds to seize the compound, capital, & airport. MEU also destroys enemy BN HQs to destroy C2.
  - (d) Attack helicopters act as a reserve to block the enemy's mechanized threat (in north) from counterattacking
  - (e) How handled the hostage situation?
    - (1) Assumed that the SEALs would free them. He had no contingency plan.
    - (2) Used PSYOPSs, but only for the purpose of getting enemy troops on the western and eastern mountains to surrender.
4. P#6

- (a) Note: This is the one participant who sees no mission for the air force. Instead, he uses naval gunfire to destroy enemy ARTY and ADA along the central ridgeline (and in the south) to set the conditions for inserting the ground forces.
- (b) Simultaneously,
  - (1) One air assault BN secures the western mountain, and the
  - (2) Rangers and MEU land in the south to secure the capital and adjacent area
- (c) Then, other air assault BN secures airfield. Once secured, it proceeds to secure the central mountain and the road north to stop reinforcements from coming south.
- (d) Does not mention the use of attack helicopters or AC-130s.
- (e) How handled hostage situation?
  - (1) Assumed SEALs could free the hostages in the south, perhaps with the help of the MEU. However, he noted that his COA "basically disregarded the hostages. If we secure the southern portion of the island, and then they begin killing hostages in the north, then that's a bitch. Okay. But that's the way it's going to go."
  - (2) Never mentioned PSYOPS

### **STEP 3: PARTICIPANTS' ANSWERS TO QUESTIONS ABOUT THEIR SOLUTION TO THE ARISLE SCENARIO ASKED IN THE STORY AND IDEAS MODULES OF THE PROTOTYPE TRAINING SYSTEM**

This report provides a quantitative analysis for seven participants' answers to the questions about their solution to the Arisle scenario that were asked in the Story and IDEAS modules of the prototype training system. In particular, we provide an analysis for the following modules: (1) Stories, (2) Identify information gaps, (3) Deconflict conflicting information and goals, (4) Evaluate assumptions, (5) Act to resolve uncertainties, and (6) Stop analysis. The seven participants are listed below:

- P#1 = Participant #3 from Ft. Riley (May 1998)
- P#2 = Participant #1 from Ft. Carson (July 1998)
- P#3 = Participant #2 from Ft. Carson (July 1998)
- P#4 = Participant #3 from Ft. Carson (July 1998)
- P#5 = Participant #1 from Ft. Stewart (September 1998)
- P#6 = Participant #2 from Ft. Stewart (September 1998)
- P#7 = Participant #4 from Ft. Stewart (September 1998)

#### **Story Module**

This module had a number of questions that have already been summarized in an earlier report discussing differences in how the participants framed "control of the island" for the Arisle scenario. These questions focused on the reasons for or against one's Course of Action (COA), one's situation goals, and how the events were connected to the goals. This analysis is not repeated here. Instead, we focus on the situation features considered by the participants and whether or not they used the different types of stories discussed in the prototype training system.

Although the seven participants' gave different answers to the question, "What situation features had the biggest effect on your COA," examination of the session summaries indicate remarkable agreement in the situation factors that they mentioned when actually developing their COAs. Since these situation features were typically addressed in the participants' COAs, even if they failed to mention them when answering the question, we have decided to list the complete list of situation features considered here. In addition, we will list who and how many of the seven participants considered them.

The situation features are divided into two groups. The first group lists features identified primarily during the participants' mission analysis, such as the composition and disposition of the enemy forces. The second group lists those features that were critical aspects of the participant's Friendly Intent Story for accomplishing their mission.

#### **Situation Features – Mission Analysis Story**

1. Enemy force is spread out (N = 7)
2. Enemy's fire support (i.e., artillery) on the high ground (N = 7)
3. Enemy air defense assets (N = 7)
4. Enemy's command and control and communications (N = 7)

5. The hostages (N = 7) [Note: For most of the participants it was the large number of hostages, who were spread out in different sites, that had to be freed by a relatively small number of SEALs]
6. Enemy's mobile reserve (N = 5: P#2, P#3, P#4, P#5, and P#6)
7. That it was difficult to move in the northern terrain, particularly the teak forest (N = 3: P#3, P#5, and P#7)
8. The potential role of the media (N=2: P#3 and P#5)

#### **Situation Features – Friendly Intent Story**

1. The need to move quickly and decisively in order to accomplish the mission of "controlling the island" (N = 7)
2. Need to eliminate the enemy's air defense artillery (ADA)
3. The need to eliminate the enemy's ability to influence friendly forces; specifically, enemy artillery whether it is on the high ground or in the pineapple plantation, and enemy C2 (N=7)
4. The need to control the southern half of the island, particularly the capital and American compound (N = 7) [Note: P#2, P#3, P#4, and P#6 did not think it was important to control the entire island, whereas P#1, P#5, and P#7 did.]
5. The need to control the airport (N = 6: P#2 did not think it was important)
6. The need to try to free all the hostages (N = 5: P#3 and P#6 explicitly did not try to free the hostages in the northern half of the island. Moreover, both P#3 and P#6 explicitly said that we should try to get the enemy to surrender without killing everyone; they were not force-oriented.)
7. The need to control the mine (N = 3: P#3, P#5, and P#7)

The Story module also asked the participants to indicate whether or not they had used different types of stories when developing their COA. As can be seen below, most of the participants used most of the different types of stories.

#### **Different Stories**

1. Friendly Intent Story? (N = 7)
2. Enemy Intent Story? (The four below said they had one.)

P#4 and P#7 – Enemy is trying to delay Americans from quickly regaining control of Arilse and, thereby, gain a diplomatic victory.

P#5 - Enemy is going to kill the hostages and use the media to exploit it.

P#6 - Enemy's legitimacy is controlling the capital and American Compound.

Five participants also identified what they considered to be the enemy's most dangerous COA. Three of five focused on the hostages.

P#2 – Enemy consolidates his forces and the hostages in a central mountain location so that he can put up a more integrated defense. "Militarily we would still win, but diplomatically?"

P#3 – Enemy concentrates his force overlooking the airport. Keeps ADA in camouflage. He lets the first wave of American planes by and,

then, attacks the second wave. Also, he hides his reaction force and, then, counter attacks once we're on the ground. Also, he moves his armor forces south, including some overlooking the airport.

P#4 – Enemy hides a lot of infantry in the American Compound and capital, so there's difficult urban fighting.

P#5 – Enemy takes a lot of hostages into the teak forest and starts killing them; he uses the media to exploit the situation.

P#7 – NOCLAS start killing hostages as soon as bombs start falling.

3. Mission Analysis Story? (N = 7)
4. Correlation of Forces Story? (N = 7)
5. Rate of Movement Story? (N = 4: P#2, P#4, P#6, P#7)
6. Principles of War? (N = 7)
7. Action Execution Story? (N = 7)
8. Evidence Interpretation Story? (N = 4: P#1, P#4, P#6, P#7)

### **IDENTIFYING GAPS MODULE**

All seven participants indicated that they wanted information about the status of the SEALs and hostages, either during development of their COA or in response to the question in italics below. In addition, five of the seven participants indicated that they wanted information about some aspect of the enemy force. In most other cases, the participants identified unique gaps, as shown below.

In most cases, participants indicated that they would try to fill the gap by some aspect of standard operating procedures (SOP). SOP ranged from coordination activities, such as a liaison with the Special Operations Force to learn the status of the SEALs and hostages, or various intelligence requirements to learn about the enemy. These different SOP are not listed below. Instead, we list only the things the participants wanted to know about.

### **WHAT ARE THE THINGS YOU WANT TO KNOW MORE ABOUT?**

1. The SEALs activities regarding the hostages (N = 7)
2. More information about the enemy (N = 5: P#1, P#2, P#3, P#4, and P#7). For example,
  - Effectiveness of the enemy's ADA? (P#2 and P#7)
  - Enemy's intent? (P#1)
  - What's the last piece of terrain the enemy wants to hold? (P#1)
  - Morale of the enemy force? (P#2)
  - Effectiveness of the enemy's fire support? (P#2)
  - More information about the enemy (P#3)
  - More information about the terrorists (P#3)
  - Where's the command post for the enemy's brigadier general (P#4)
  - Are there enemy mines in the harbor that might delay the MEU? (P#4)

- What would be the enemy's deception plan? (P#4)
- What is the status of the enemy's equipment? (P#7)
- What is the level of the enemy's training? (P#7)
- What is the enemy's level of combat experience? (P#7)
- What are the enemy's communications capabilities? (P#7)
- 3. More information about the friendly force (N = 2)
  - Its status and morale (P#2)
  - The plans for the Delta Force (P#7)
- 4. More information about friendly intelligence (N = 2)
  - Was the depicted enemy situation correct? (P#4)
  - What's national intelligence doing? (P#7)
- 5. More information about tides (N = 2: P#2 and P#3)
- 6. More information about the media (N = 1: P#3)
- 7. Information about different avenues for diplomatic negotiation (N = 1: P#3)
- 8. Ramifications of attacking the island. Is anyone going to try to help the enemy (i.e., Mainlandian) force? (N = 1: P#3)
- 9. Are all the hostages American? (N = 1: P#3 assumed so)
- 10. There are Japanese, Canadian, and Australian citizens on the island. Are these countries going to help the US? (N = 1: P#3)
- 11. What are the Rules of Engagement? (N = 1: P#3)
- 12. More information about the Oregonium mine and area around it (N = 1: P#3)
- 13. Were refugees fleeing from the island? (N = 1: P#3)
- 14. More detail about the terrain (N = 1: P#7)

### **DECONFLICT MODULE**

This section is divided into two parts. The first part deals with conflicts that the participants identified regarding the information. The second deals with goal conflicts.

#### **EXAMPLES OF CONFLICTING INFORMATION**

None of the seven participants identified the conflicting information in the written materials regarding the sophistication of the enemy's air defense assets (ADA). The researcher did not always tell the participant about the conflict. In two cases, however, the researcher did and the participants said it would not matter how sophisticated the enemy's ADA was because our air forces would still overwhelm it. The identified information conflicts are listed below.

1. Written materials imply that the mine is important, but enemy forces are not massed to protect it or other critical assets in the south (N = 3: P#1, P#5, and P#7)
2. The written materials say that the SEALs have the hostages under surveillance, but it's not clear how 40 SEALs are watching over 140 hostages (N = 2: P#5 and P#7)

3. How was the enemy able to move his forces from Mainlandia to Arisle without our knowledge? (N = 1: P#7)
4. The written materials said that it was overcast and that we didn't have a good picture of the island. Yet, we've pin pointed the location of their artillery and armor forces. (N = 1: P#7)
5. Ground component commander has to coordinate with the Special Operations Force (SOF), but the written materials do not indicate if there is a liaison. There would have to be one. (N = 1: P#7)

### **EXAMPLES OF CONFLICTING GOALS**

Six of the seven participants noticed the conflict between the goal of controlling the island quickly and freeing the hostages safely. P#1 was the only participant who did not notice the conflict because he thought we could accomplish both goals. Other examples of conflicting goals are presented below.

1. Conflict among enemy goals. The enemy wants international legitimacy, but he's threatening to kill all the hostages. Killing hostages will result in international wrath, not legitimacy. (N = 1: P#1)
2. We want to act quickly, which argues for simultaneous attacks, but at the same time we want low casualties, which argues for a slower, more methodical buildup. (N = 1: P#2)
3. Destroy enemy, but minimize collateral damage. Can only be accomplished by pairing certain combat assets against certain targets. (N = 1: P#7)

### **EVALUATE ASSUMPTIONS MODULE**

This section lists the key assumptions identified by the participants. The two big assumptions were that the air and/or naval forces could suppress the enemy's fire support (i.e., artillery) and air defense artillery (ADA) assets, and that the SEALs could free the hostages. Other assumptions were unique to participants.

1. Air and/or naval forces will be successful in suppressing the enemy's fire support and ADA (N = 5). Although all 7 participants made this assumption when they "set the conditions" using air and/or naval forces prior to committing ground forces, it was emphasized by P#2, P#3, P#5, P#6 and P#7.)
2. Assumes that SEALs can free hostages (N = 4: P#1, P#2, P#4, and P#6). Here's how each of the seven participants dealt with the hostage situation.

P#1 – Assumes that the SEALs can free the hostages, but keeps Rangers as a reserve in case the SEALs need help. In addition, during training, he created no fire zones around certain targets until SEALs freed hostages at those sites.

P#2 – Assumes that SEALs can free hostages, but gives Rangers an explicit "be prepared" mission to help SEALs if needed.

P#3 – Only tries to free hostages in the southern half of the island. After he gains control of the south, he'll negotiate with the enemy to surrender the hostages and its regular army forces.

P#4 – Assumes that the SEALs will free the hostages. He has no contingency plan.

P#5 – Does not think the SEALs can free the hostages by themselves. So, he has Delta Team come in early to secure the mine and free the hostages in the American Compound and adjacent area. This leaves the SEALs free to rescue as many other hostages as possible. He has the Rangers in reserve to help too.

P#6 – Assumes the SEALs can free the hostages, perhaps with the help of the MEU. But as he admitted, his COA “basically disregarded the hostages. If we secure the southern portion of the island, and then they begin killing hostages in the north, then that’s a bitch.”

P#7 – Would have the Delta Team help the SEALs because he believes that there were not enough SEALs to free all the hostages.

3. Assumes that the task force has a Q-36 radar to locating counter-battery artillery (P#1)
4. Assumes that everything is 100% with the US force (P#2)
5. Assumes that we’ll attack even if the weather is bad (P#2)
6. Assumes that the INTEL picture is fairly accurate (P#2)
7. Assumes that the Rangers find suitable drop zones near the high ground so that there is no massacre coming down in parachutes (P#2)
8. Assumes suitable landing zones for the helicopters too (P#2)
9. Assumes that we have to do a military operation because of the political situation. Diplomatic negotiations would not work or would not end in time. (P#3)
10. Assumes that the enemy was not a sizable or capable force (P#3)
11. Assumes that the enemy had a C2 conflict between his ground forces and the NOCLAS controlling the hostages (P#3)
12. Assumes that neither the pineapple plantation nor the teak forest was good for operations (P#3)
13. Assumes that the weather would be cooperative (P#3)
14. Assumes most of the Migs and HINDs are destroyed on the ground (P#3)
15. Assumes that we successfully cut enemy communications (P#3)
16. Assumes that all hostages are currently under surveillance and accounted for (P#5)
17. Assumes that the port facilities are not destroyed (P#5)
18. Assumes that the airfield is not destroyed (P#5)
19. Assumes that the mine is not destroyed (P#5)
20. Assumes that there would not be a lot of counteraction from the enemy’s regular Army (P#5)
21. Assumes that the enemy’s armor forces remain in the north (P#7)



## ACT MODULE

This section lists the different actions that the participants indicated they would take to fill in information gaps or deal with conflicts. Most of the actions listed represent activities that are part of a task force's standard operating procedure. [Note: There was no data for P#6 because the tape was not on and answers not listed in researcher's notes.]

4. Stay in contact with the SEALs (N = 7: All participants mentioned this, but only P#7 stressed the need for coordination with the SOF through a liaison.)
5. Be proactive. Instead of trying to predict (or react to) enemy intent, hit the enemy with air strikes and simultaneous attacks to overwhelm them (N = 7. All participants did this to various degrees, but only P#1 mentioned it explicitly.)
6. Use various intelligence collection capabilities to obtain information about the enemy, such as human intelligence (HUMINT) from the SEALs or guys on the ground and photo imagery (N = 5: P#1, P#2, P#3, P#4, P#7). [Note: P#4 also mentioned the importance of Battle Damage Assessments before proceeding with inserting ground forces.]
7. Two participants explicitly described actions they would take to deal with the uncertainties about the enemy's mobile reserve.

P#3 said he would use AC-130s to destroy the HINDs so that the enemy's mobile reaction force couldn't move quickly.

P#4 said that he used deception, where he tried to make it look like the MEU was going to land in the east to take the eastern mountain, in an effort to get the enemy's mobile reserve to move from the central mountain area.

[Note: P#1 said he would have the MEU feint a landing in the north to get the enemy to try to reposition his forces. However, he did not indicate that he was explicitly trying to get the mobile reserve moving, so he was not included here.]

8. Two participants explicitly described actions they would take with respect to uncertainties about the enemy's armor forces

P#4 said he would use his attack helicopters as a reserve to block the enemy's mechanized threat in the north from counterattacking.

P#7 said he'd use the AC-130s over the airport to cover the Rangers in case there were enemy tanks hiding near it.

9. P#2 said he would look at historical records to learn more about how the enemy has fought in the past.
10. P#3 said he would stay in touch with the G-5 (Public Affairs Officers) to get updates on the media.

## STOP MODULE

This module had a number of questions. Unfortunately, all the participants did not all the questions, probably because this module came late in the interview session and time was running out in some cases. P#6 did not answer any of the questions for this module. The answers to each question is presented in turn.

**HOW MUCH TIME WOULD YOU TAKE IF THIS WERE A REAL SITUATION? (NOTE: P#5 AND P#6 DID NOT ANSWER THIS QUESTION.)**

P#2 and P#4 thought they could do the division-level planning within 3 hours with there was a staff. In fact, P#2 thought a recommended COA might be developed in an hour if the staff had done all the estimates previously.

P#1 thought the planning could be completed within 3-5 hours with a full staff, and that the attack could begin with 24 hours.

P#3 said that planning would take 8 hours, and that the attack could occur within 24 hours, using the "1/3 - 2/3 Rule;" that is, take 1/3 of the available time for division-level planning, thereby leaving 2/3 of the time for the planning by lower-echelon units.

P#7 thought the Arisle scenario was realistic, but he didn't think that the planning could be accomplished in 24 (or even 36) hours because of the time needed for inter-service coordination, particularly for the coordination of fires on critical targets.

*Costs of delaying the mission?* (Note: P#5, P#6 and P#7 did not answer this question.)

1. Gives the enemy time improve his battle positions, either by digging in or using camouflage (N = 4: P#1, P#2, P#3, and P#4)
2. Allows the enemy time to try to get reinforcements or re-supply himself, for example, by using small planes and boats (N = 3: P#1, P#2, and P#3)
3. Gives the enemy time diplomatically to try to win a political victory (N = 2: P#1 and P#2)
4. Enemy could kill (or start killing) the hostages (N = 2: P#2 and P#4)
5. Enemy could move his forces (N = 1: P#2)
6. The enemy could stir up the media (N = 1: P#4)

*Unresolved uncertainties when start mission?* (Note: P#6 and P#7 did not answer.)

1. Whether SEALs have control of the hostages or even where they are (N = 4: P#1, P#3, P#4, and P#5)
2. Not knowing where all the enemy's ADA is located (N = 2: P#2 and P#4)
3. Not being able to pinpoint all the enemy's forces (N = 2: P#2 and P#3). [Note: P#2 did think one should try to pinpoint all the enemy's forces. Instead, one should focus on key terrain.]

*Potential costs of not resolving uncertainties?* (Note: Not answered by P#1 or P#6)

1. Loose aircraft carrying troops, and take severe casualties (N = 3: P#2, P#4, and P#7)

Note: During the Crystal Ball exercise, P#4 said he would actually change his COA. Specifically, he would tell the air assault brigade to be prepared to have one company attack 1 to 3 ARTY batteries if the Rangers were unable to take them out; for example, because they were shot down.

2. Attack a site with no hostages (N = 1: P#3)
3. Attack a decoy C2 node (N = 1: P#3)

4. Attack more dug-in positions (N = 1: P#3)

5. A lot of hostages are killed (N = 1: P#5)

*Which uncertainties could be resolved if you took more time? (Note: Only answered by P#1)*

1. Could better find the enemy ADA

2. Could better use one's air assets against enemy targets

**COSTS OF DELAYS VERSUS COSTS OF ERRORS? (NOTE: ONLY ANSWERED BY P#1, P#2, P#4, AND P#7.)**

P#1: The biggest potential error is that you can't free the hostages. If this happens, he'd continue the mission without delay using his contingency of the Rangers and, then, the MEU.

P#2: "We want to strike when it's dark and within 24 hours. So, we may not know [where] their ADA [is]. We put the best plan together that we can, and then proceed."

P#4: "Hard question to answer because of the mission statement. Seems to me that we have a pretty good picture of the enemy situation. So, get a plan and execute."

P#7: "The cost of errors is obviously high because, if the INTEL is lacking or the SA-13s don't get taken out, one missile can take down a C-130 with 65 airborne troops on it or an assault CP (command post). So, you've got to take the time to make sure the coordination is done to take out the critical targets."

**DEVIL'S ADVOCATE (I.E., CRYSTAL BALL) MODULE**

This section describes the different problems the participants considered when doing the Crystal Ball exercise. We note here that 3 of the participants (P#2, P#3, and P#5) identified "failure to suppress the enemy's ADA" as the problem they considered. The only reasons given that were common to the three participants were that we had bad intelligence or that the enemy was better (in some way) than we thought. And there were a number of reasons that were only generated by one of the three participants. As we noted earlier, none of the seven participants identified the conflicting information in the written materials regarding the sophistication of the enemy's air defense assets (ADA).

P#1: Focused on the plan for freeing the hostages. In particular, P#1 identified two ways that the plan might fail. First, the NOCLAS might move the hostages; so, make sure to keep them under surveillance. A second way that we might fail to free the hostages is if the enemy has more guards than we thought. In this case, we'd have to free them as part of the attack.

P#2: This participant began by identifying the following, different ways that the mission could fail.

1. We failed to suppress their ADA and fire support
2. They killed all the hostages.
3. They were more effective fighters than we thought, inflicting casualties on us at higher numbers.

4. They had more effective command and control than we thought, so they were able to reposition their forces.
5. As we spread our forces, they were able to concentrate on us because our attack was ill timed.

Then, P#2 focused on four different ways that we could have failed to suppress the enemy's ADA and fire support.

1. Our INTEL guy screwed up, so we didn't find them.
2. The enemy was really dug in, so our suppression was not effective.
3. We had problems with our equipment.
4. Our tactics failed, which would include the weapon systems and the munitions that we employed against their systems.

Then, P#2 was asked to imagine that his assessment of the enemy was wrong. What was it? He responded as follows. "Okay, one of my assessments is that they will not be able to reposition to support each other. I'm assuming that because we've interfered with their C2 communications. So, how could they do it?" He listed the following reasons.

1. "They have alternate communications. Land lines? [They could have lain wire] over those distances. Did I consider that? NO. Perhaps we put guys in there to disrupt that communication if we can confirm it.
2. So, we have cut their phone lines and they're still able to reposition. How? Answer: Initiative of the individual commanders on the ground. Hearing the attack on his compadres, he's able to move to the sound of the guns. If they're an elite unit, they might be able to do that. How do we stop it? There's nothing we can do to prevent that other than to add forces to meet their repositioning forces. Then, regardless of how they reposition, we'd block them. ..."

P#3: We failed to knock out the enemy's ADA (and communications?). How could that have happened?

1. They were dug in.
2. We couldn't identify their ADA because they didn't paint the aircraft (with their radar) when we flew over.

How deal with these reasons?

1. Change aircraft munitions loads to concrete piercing ammunitions.
2. Make the ADA a secondary mission for the SEALs.

P#4: Assumed we could move to Arisle unopposed, but said that may not be correct. They may have a Stinger missile on a fishing boat.

P#5: Different ways that a majority of the ADA survives.

1. Bad intelligence regarding its location
2. Air force not able to destroy them because they're better than we think
3. They have a lot more ADA than we thought
4. ADA is dispersed and stockpiled among other units
5. Enemy redistributes ADA from one part of the island to another

6. Bad intelligence with respect to the type of ADA systems

7. Very bad weather

P#6: Exercise not on the tape or documented in researcher's notes.

P#7: MEU failed to achieve their mission of landing at the southern beach and destroying the enemy in the southwest sector, including the western mountain. P#7 gave two possible reasons for the failure, and how he'd plan to avoid it.

1. Enemy has mined the beach; so, I'd have SEALs go in first to clear it.
2. Helicopters shot down; so, I'd have AC-130s cover the MEU's landing and take out any remaining SA-13s as a backup to our HARM missiles

### **STEP 3: SIMILARITIES AND DIFFERENCES IN PARTICIPANTS' ACTION ORIENTATIONS**

After each participant presented their recommended Course of Action (COA) for the Arisle scenario, we asked them to review each of the training modules in the prototype system we were developing to support the Army in training critical thinking skills. As part of this review, we asked the participants to answer a set of questions focusing on the extent to which the material in the training module was also inherent in their recommended COA.

This brief report summarizes the similarities and differences in how seven participants answered questions regarding the "action orientation" of their recommended COA. In particular, the report describes the total number of proactive, predictive, and reactive actions identified by the participants, and their similarities and differences.

The seven participants are listed below:

- P#1 = Participant #3 from Ft. Riley (May 1998)
- P#2 = Participant #1 from Ft. Carson (July 1998)
- P#3 = Participant #2 from Ft. Carson (July 1998)
- P#4 = Participant #3 from Ft. Carson (July 1998)
- P#5 = Participant #1 from Ft. Stewart (September 1998)
- P#6 = Participant #2 from Ft. Stewart (September 1998)
- P#7 = Participant #4 from Ft. Stewart (September 1998)

The two participants from Ft. Bragg (i.e., P#8 and P#9) are not included in this analysis because they were not asked to identify the proactive, predictive, and reactive actions in their recommended COA. In fact, P#8 and P#9 are only included in the analysis regarding how participants framed "control of the island" and their COA. They are not included in the other analyses because the other analyses were based on answers to questions that were modified considerably after the Ft. Bragg interviews. Consequently, the remainder of their interviews (i.e., the part reviewing the training system prototype) was not comparable to that for the other seven participants.

The remainder of this report is divided into three sections. The first section focuses on the number of actions identified by the participants. The second section focuses on the degree to which participants identified the same actions. And the third section lists the different types of actions actually identified.

#### **The Number of Actions Identified by the Participants**

Table 1 shows the number of proactive, predictive, and reactive actions identified by each of the seven participants. The arithmetic mean was 9.7 for the total number of actions. Six of the 7 participants identified between 7 to 10 actions in total; P2 identified 18.

**TABLE 1**  
Number of Actions Identified by Each Participant

Type	P1	P2	P3	P4	P5	P6	P7	Means
Proact.	5	7	3	4	5	4	3	4.4
Predict	4	6	2	2	2	1	5	3.1
Reactiv	1	4	2	3	1	2	2	2.1
Sum	10	17	7	9	8	7	10	9.7

Perhaps more interestingly, the participants identified proactive actions the most and reactive actions the least. A repeated measures t-test found the difference between the mean number of proactive and reactive actions to be significant at the  $p < 0.01$  level for a two-tailed test [ $t(6) = 4.39$ ]. No other difference was statistically significant at the  $p \leq 0.05$  level.

#### THE DEGREE TO WHICH PARTICIPANTS IDENTIFIED THE SAME ACTIONS

The analysis described in the preceding section simply counted the number of actions identified by the participants. In this section, we look at the extent to which the participants identified the same or different actions. In doing this analysis, we first listed the distinctly different proactive, predictive, and reactive actions identified by the seven participants. (This list is presented in the next section.)

If one simply adds the number of proactive actions listed in Table 1, the participants identified a total of 31 proactive actions. However, only 11 of these 31 actions (i.e., 35%) were different; 20 of them were identified by two or more participants. The same was also true for the predictive (15 of 22 = 68%) and reactive actions (i.e., 10 of 15 = 68%), although in both cases, the percentage of distinctly different actions was markedly higher. These percentages suggest that the participants were more likely to identify similar proactive actions than predictive or reactive ones.

Table 2 lists the number of distinctly different proactive, predictive, and reactive actions identified by three or more participants, by two participants, and by only one participant. Examination of this table shows that three or more participants identified 5 of the 11 distinctly different proactive actions (i.e., 45%). In contrast, three or more participants only identified 1 of the 15 different predictive actions (7%), and only 1 of the 10 reactive actions (10%). Perhaps even more surprisingly, two or more participants identified 9 of the 11 proactive actions (i.e., 82%). In contrast, two or more participants identified only 5 of the 15 distinctly different predictive actions (i.e., 33%) and only 3 of the 10 different reactive actions (i.e., 30%).

A chi square test was performed on the data in Table 2 to assess if the degree of similarity for the proactive actions was significantly different than that for the predictive and reactive actions. The results of that test were significant statistically ( $\chi^2 = 10.03$ ,  $p < 0.05$ ), providing some statistical support for the position that the participants agreed more

on the types of proactive than predictive or reactive actions they identified as being inherent in their recommended COAs.

**TABLE 2**

**Degree of Similarity in the Proactive, Predictive, and Reactive Actions**

Action Orientation	Actions Identified by $\geq$ 3 Participants	Actions Identified by 2 Participants	Actions Identified by 1 Participant	Total Number of Different Actions
Proactive	5	4	2	11
Predictive	1	4	10	15
Reactive	1	2	7	10
Total	7	10	19	36

#### The Different Actions Participants Identified

This section lists the distinctly different proactive, predictive, and reactive actions identified by the participants, and which participants identified them. It is noted here that a separate analysis was performed to determine if participants who defined the Arisle scenario similarly tended to agree more on their proactive, predictive, and reactive actions than those who defined it differently. [The two definitions were control of the entire island (P#1, P#5, and P#7) or control of only the southern part (P#2, P#3, P#4, and P#6).] However, we failed to find a systematic relationship. For example, P#1 and P#2 agreed on four proactive actions, as did P#5 and P#6. In both cases, the members of the pair had defined "control" differently.

#### Proactive Actions (N=11)

- Keeping enemy divided so that he can't mass his forces, including the inability to reposition his reserves. [P#1, P#2, P#4, P#5, P#6, and P#7]
- Focusing on the enemy's artillery and air defense assets and, more generally, taking away the high ground. [P#2, P#4, P#5, P#6, and P#7]
- Going after the enemy's communications to disrupt his command and control. [P#2, P#3, P#5, and P#6]
- The attack itself was considered proactive by three participants [P#1, P#2, and P#3]
- Seizing the urban areas (specifically the capital, which was Beagua, and Mar Blanche) and the airport [P#3, P#5, and P#6]
- Hitting fast and in multiple places in order to take away the enemy's ability to react because he doesn't know where we're really going. [P#1 and P#7]
- Gaining control of the hostages. [P#1 and P#2]
- Quickly gaining control of the mine. [P#1 and P#5]



- Using Psychological Operations (PSYOPS) to try to get the enemy to surrender [P#2 and P#4]
- Eliminating the enemy Migs. [P#2]
- Use of deception. [P#4]
- Predictive Actions (N=15)
- Predicted that enemy would move forces into the forest. [P#1, P#5, and P#6]
- Predicted that enemy could not quickly reposition his forces (particularly if one eliminated his mobile reserve) with the result being isolated fights. [P#2 and P#5]
- Predicted that enemy on hills would attack our troops. [P#1 and P#7]
- Predicted that enemy command and control would fall apart if we eliminated his FM communications [P#2 and P#7]
- Predicted the success of the SEALs because we had confirmed hostage locations. [P#2 and P#7].
- Predicted that our HARM missiles and counter-measures will defeat the enemy's air defense assets. [P#1 and P#7]
- Predicted that enemy will try to move forces from Nipponia. [P#1]
- Predicted that enemy would not move forces from Nipponia. [P#7]
- Predicted that enemy would not be able to get additional supplies or forces on the battlefield. [P#2]
- Predicted that enemy would move his air defense assets. [P#2]
- Predicted that mission success would be unattainable if lost X amount of aircraft with troops. [P#2]
- Enemy would predict that we'd do an amphibious assault. [P#3]
- Enemy would predict that we'd try to free the hostages. [P#3]
- Predicted that enemy would respond to his deception in the east by moving his mobile reserve. [P#4]
- Predicted that enemy will not think we'll land in the center of the island, which is in range of his artillery. [P#4]
- Reactive Actions [N=10]
- We'd have to readjust significantly if the SEALs fail. [P#2, P#4, and P#5.]  
Note: P#6 explicitly said he would not adjust if the SEALs fail.
- The invasion itself is reactive to Mainlandian forces seizing Arisle. [P#3 and P#7]
- We'd have to react if some of our forces were degraded or compromised; for example, if we lost an aircraft with a parachute battalion. [P#2 and P#7]
- I'd have to react to the fact that the enemy currently owns the airport. [P#1]
- We'd have to readjust and be more cautious if they successfully hide they artillery and air defense assets. [P#2]
- Can react to bad weather unless it's really bad. [P#2]

- We're reacting to his counter-fire assets by bringing in the Q-36s. [P#3]
- We'll have to react to his reserve. [P#4]
- Clearing out the enemy if they don't surrender. [P#4]
- We'd have to react if we had bad intelligence regarding enemy locations.  
[P#6]